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# COMMERCE

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# Automobile ancillaries

—A FEATURE

## onstraints on development

A Special Correspondent

HE automobile ancillary industry has shown a id development during past few years. In 1970-71 production of components valued at Rs 133 crores, h a growth of 13 per cent ing the year. Components all ranges are now made igenously. The ancillary ustry supplies 45 per cent the component needs of icle manufacturers as inst 25 per cent five years . Besides, it meets the uirements of 1.7 million icles on the roads.

he ancillary manufacrs say that the shortage components is due to the tage of essential raw erials as well as restrics on the major manuurers under the monoes law. The industry is of the largest consumers steel including tool, alloy special steels. The inry also consumes large ntities of non-ferrous als and chemicals. With exception of aluminium, other non-ferrous metals produced in the counand the industry has rely entirely on the orts. The government's sion to import steel in er quantities this year created hopes in the inry circles that the ancilunits would be allotted led quotas for their proion programmes. With establishment of alloy plants, the industry is ing efforts to maximise use of indigenous steels place of imported steels. process will necessarily slow. Till that time the stry wants the government to allow imports of steels for those qualities which are not yet made indigenously.

The industry has substantially contributed to import substitution. A research institution in Tamil Nadu has developed an inhibitor that can prevent corrosion of steel by radiator water. This makes it possible for use of steel in the manufacture of automobile radiators. Conventional radiators require brass and copper, which are mainly imported.

Initially the industry turned out mainly pistons, fans, belts, radiators, rubber hoses, silencers and leaf springs. At present well over 100 items are produced. The production range includes engine parts such as pistons, gaskets, cylinders, valves, carburettors, fuel pumps, nozzles and ball and roller bearings.

The industry says that while the demand for the spare parts continued to increase all these years, production could not keep pace with it. The government had issued many letters of intent to new entrepreneurs but many of these units were not set up in time. There was also delay in sanctioning expansion of the larger units. The industry's progress is dependent on the rise in production in the manufacture of commercial vehicles, cars, scooters and tractors. To the extent the production of the units producing these items is not able to keep pace with the rise in demand the ancillary industry also suffers.

Despite the fact that the industry is well-established the quality of components needs to be improved. A visit to any of the plants of the commercial vehicles or car producers gives an idea of the rejections of the components supplied by the ancillaries. Surprisingly components from some of the larger units also appear on these rejection lists. The testing facilities at the major units need to be augmented. For small units the financial institutions should make available separate long-term loans at low rates of interest to invest in the testing equipment.

The market in sub-standard components is fed by the parts rejected by the bulk purchasers. The industry has to take steps to ensure that sub-standard components are not produced. The bulk consumers of spare parts like the state transport undertakings, the Directorate General of Supplies and Disposals and the defence establishments should also make it a policy to purchase the components from the manufacturers of genuine products rather than from the cheapest tenderer. This will go a long way in encouraging quality.

The ancillary manufacturers are bitter about the delay in payments for the purchases of components by the government as also other consumers. The small units are hit mostly as they are not in a position to dictate their terms. There are instances when the units have waited for 12 to 15 months to receive their dues. On the other hand the suppliers of raw materials including the government-sponsored organisations like the Hindustan Steel and Minerals and Metals Trading Corporation of India demand payment in advance much ahead of the delivery period. The industry wants that the bill market scheme of the Reserve Bank should be made applicable to the bulk buyers of components. ☐

**The automobile ancillary industry's growth : 1962-71**

(Value in million Rs.)

| | 1962 | 1963 | 1964 | 1965 | 1966 | 1967 | 1968 | 1969 | 1970 | 1971 |
|---|---|---|---|---|---|---|---|---|---|---|
| Engine parts .. .. .. .. | 81 | 104 | 139 | 176 | 212 | 261 | 291 | 327 | 408 | 413 |
| Electrical parts .. .. .. .. | 7 | 10 | 22 | 40 | 55 | 65 | 64 | 81 | 86 | 106 |
| Drive, transmission and steering parts.. | 9 | 26 | 54 | 78 | 101 | 122 | 129 | 164 | 195 | 237 |
| Suspension and braking parts .. .. | 36 | 51 | 74 | 93 | 118 | 173 | 174 | 195 | 235 | 274 |
| Equipment .. .. .. .. | 8 | 12 | 21 | 28 | 29 | 38 | 44 | 52 | 54 | 69 |
| Chassis and body parts .. .. .. | 7 | 12 | 13 | 10 | 25 | 34 | 32 | 32 | 55 | 66 |
| Miscellaneous .. .. .. .. | 30 | 45 | 50 | 63 | 74 | 127 | 108 | 110 | 144 | 167 |
| Total .. | 178 | 260 | 373 | 497 | 614 | 820 | 842 | 961 | 1,177 | 1,332 |

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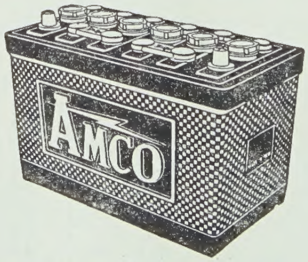

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# Sophistication in engine valves

**By A. K. Mukherjee**

HE growth of the automobile ancillary industry s slow during the first plan iod. The production of histicated items such as t and exhaust valves rted only during the second -year plan period. During third plan period the duction of automobile an- ary was worth Rs 52.8 res, and the output has n since increasing.

here are four units on the of the Directorate-Gene- of Technical Development ducing engine valves. The nsed capacity of these s is 54 lakhs. Their pro- ion in 1971 was 46.25 s. The estimated demand 973-74 is Rs 1.20 crores. government has issued rs of intent to 21 units.

e working group of auto- ile ancillaries has recom- ded that the existing an- ries industry should be n all assistance to in- se its production and be ved to import improved hology as a matter of se. Use of imported hinery and know-how ld be freely permitted. the same time, steps ld also be initiated to blish more indigenous es of supply in different ions throughout the try, and above all the le manufacturers should iscouraged from making laries themselves.

e automotive industry devoted years to the de- and development of en- valves and on the choice aw material to ensure mum valve-life. The most non type of valve used in nobiles is poppet valve, n is made of high tensile steel since it is subject- severe impacts, tension high temperature. The material generally used in India for the manufacture of inlet valve is EN-52 alloy steel. The other materials used for exhaust valves are XB steel, EN-54, Nimonic 75, Inconel M, Sil 10, XCR etc. The alloy steels used here are much less used in developed countries. Life, durability and the cost are the guiding factors, since for the failure of one valve the entire engine may have to be dismantled at a much higher cost. For exhaust valves the use of austenitic steels or the nimonic alloys is also common. Stellite-faced valves are also common. Generally, two types of stellites are used for valve tip (in view of the high impact loads) and for the seat. Other surface finishing techniques like tuftriding, carbonitriding and aluminium dipping have been developed. Chromium plating of the valve stem is employed when certain high steels are used for the complete valves and the valve stems would not have satisfactory wearing properties. In normal practice, however, flame-hardening is used for the tips.

In India, it is essential that the raw materials, whether imported or indigenous, are made available to the manufacturers at a reasonable price, which compare favourably with the international prices. Due to uncertainties of deliveries, the manufacturers are today compelled to keep high inventories. There is a suggestion that steel banks should be opened at principal centres of industrial activity so that the producing units could draw their requirement of raw materials from a nearby place. Shortage of raw materials has prompted many unknown manufacturers to come in to the replacement market with inferior quality products.

The manufacturing technique calls for specialised skill and high degree of accuracy. Machine tool requirements of this industry calls for special purpose machines, which are required to be highly productive and at the same time maintain dimensional tolerances, consistently. Since the engine value industry depends mainly on foreign know-how and assistance, most of the capital goods and machinery installed in these plants are imported. In order to keep pace with the progress made elsewhere it is necessary to have custom-built and special purpose machines at short notice. Though the Indian machine tool industry has made reasonable progress in this direction, it is not yet in a position to offer assistance within a reasonable time. In some cases, the deliveries take about 16 months. To obviate the difficulty arising out of delayed supplies, it is necessary to allow the valve manufacturers to import the necessary capital equipment on the basis of replacement and modernisation.

The failure of a valve causes considerable expenses in dismantling the entire engine. Quality control has therefore to be exceedingly rigid and thorough. The manufacturers with foreign collaboration have quality checks for their products to make it comparable to the international standards. Adequate facilities exist for quality control from raw material stage to the final stage of finished products. For a small manufacturer it may be difficult to have the technical know-how for making valves to existing standards. The working group has recommended that for acceleration of standardisation process the vehicle manufacturers and ancillary producers should establish a close liaison, the Indian Standards Institute should set up performance standards, and that the vehicle manufacturers should insist on components to conform to ISI standards.

The Automobile Research Association of India (ARAI) which is to be set up in Poona by 1973 with the co-operation of the automotive industry is expected to establish comprehensive testing and research facilities. Much of R & D requirements would be met by the ARAI when it starts working. At present only the collaborators' technical know-how is available to valve manufacturers and consequently the progress of R & D is perhaps not fast enough.

The working group has recommended that every industrial unit should have a R & D department and that a percentage of the total turnover should be set aside for the investment on R & D. This is a welcome suggestion particularly when many of the technical agreements are due to be terminated. While it is true that self-sufficiency has been achieved in the manufacture of engine valves in the country, we do not have the capacity yet tó keep pace with the international developments.

Many of the collaborators today provide technical training to Indian personnel in their factories abroad and most companies have taken advantage of this. A time has now come, when we have to start training our R & D men abroad rather than manufacturing personnel to make us self-sufficient. We as a developing country, cannot continue to depend on foreign know-how and borrowed technology for an indefinite period of time. Therefore, the sooner we take advantage of training of our R & D engineers abroad the better.

On the question of import substitution, the engine valve manufacturers are not free agents to decide on this matter. It is very much dependent on acceptance by the vehicle manufacturers. Every effort should be made to develop alternative and more economical products through close co-operation of R & D of the vehicle manufacturers, the valve manufacturers and also of the ISI.

Most manufacturers who export valves find it difficult

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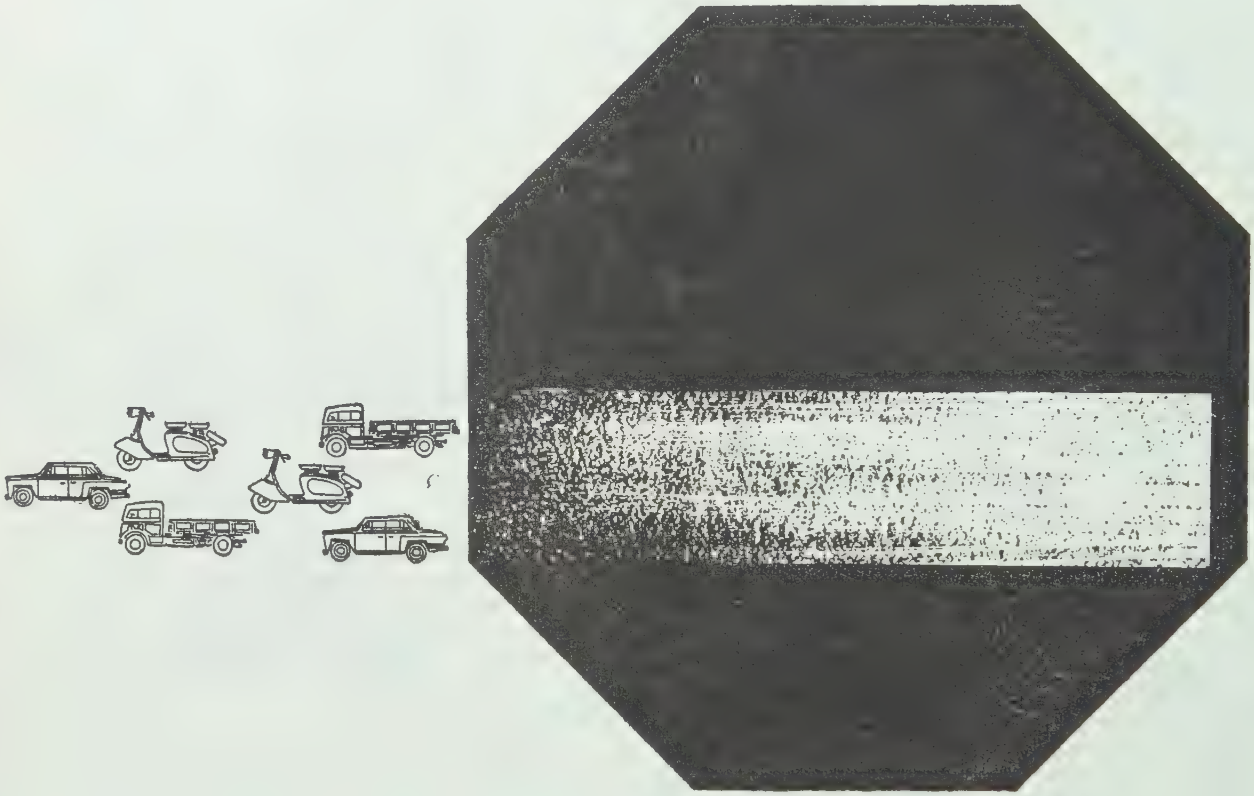
*Mukherjee is chief exe- e of Acme Manufactur- o Ltd, Bombay.*

**There is one thing the automobile industry will never put the brakes on**



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satisfy the international arket in respect of price. nless the raw material is ailable at the international ices, it will be difficult to mpete in the export mar- ts. Additional import quota r raw materials could be leased by the government ainst export guarantee by e manufacturer. But un- ss the raw material price problem is solved, higher export figure may not be achieved. The government should also accord special terms and assist in export promotion activities and help individual companies in obtaining export orders. The exporters on their part should pay serious attention to establish an after-sale-service network with the assistance of government agencies.

There was once a feeling among the automotive repairing men that modern engines did not need the valve-service as often as older engines did. Actually, the reverse is the truth. Although modern engines are better designed and use improved materials, valve-service is needed more often than it used to be. The engine valve industry is fully aware of this and will continue to make determined efforts to make the industry technologically competent and up to international standards. ☐

# Design improvement in radiators

**By A. R. Kulkarni**

HE automobile needs a compact heat exchanger— e automobile radiator—to ssipate excess heat generat- by its engine. Even though e cooling of an engine may effected either by air or y liquid, air-cooling is used ly where low weight/ wer ratio is required and ese engines are not as effi- nt as water-cooled engines. ailability, low cost, high ecific heat, high heat-trans- co-efficient and simple thod of control make water exceptionally good cooling dium.

Efficient running of any en- ie depends upon the ther- l efficiency of its cooling tem. Surplus heat pro- ced in the combustion amber has to be disposed of the temperature of the gine must be controlled.

To minimise the radiator e, it is desirable to operate coolant system at as high temperature as possible to e the maximum practicable nperature difference be- een the liquid coolant and cooling air. On the other nd, to minimise coolant poration losses, it is de- able to keep the system nperature below the boiling nt of the coolant. This implies that the system should be pressurised within the limits imposed by simple rubber hose connections. While the situation is obviously complex, experience indicates that a coolant system operating at temperatures between 180°F and 205°F represents a good compromise.

The air should pass through the radiator before reaching the engine rather than *vice-versa* to avoid oil falling on radiator surfaces and loss in heat-transfer performance. The most difficult situation arises on a hot summer day when the air temperature entering the radiator may easily reach to 100°F. For petrol engines excessive air temperature around the fuel pump and carburettor induces boiling of the petrol and vapour locking. To avoid this effect, and to maintain LMTD as large as possible, the air temperature rise through the radiator should be limited between 15°F and 20°F.

Both fan power requirements and noise considerations make it desirable to limit the pressure drop across the radiator to about 20 psf.

There are three major types of core designs:

(1) *Interleaved film type (Honey-comb type)*: This is a foil construction in which no separate tubes are used. The water passages are made from two strips so formed that their edges may be brought together leaving a rectangular opening between them. The copper foils are corrugated and are joined by solder bonding. No header-plates are necessary because the ends of the water-ways are folded back to form a more or less flat surface, to which the tank is directly soldered. This is the oldest design, and as compared to other designs, it is quite difficult to stop the heavy leaks.

(2) *Corrugated film and flattened tube type (McCord type)*: This is a rectangular or elliptical tube and corrugated (Z-bending) film construction. Corrugated foils are soldered to the flat sides of the tubes. The corrugated fins may be punched or stamped to slits, waves, joggles and steps at regular intervals. The purpose of louvering is to break up the boundary layers and to increase turbulences so as to yield higher heat-transfer conductance. With this construction it is possible to achieve a very large area-compactness or heat-transfer area per unit volume. Nowadays this design is popular and is being adopted for the development of aluminium radiators.

(3) *Plain fin and flattened tube type (Tubular fin type)*: This is the most popular design among the various designs of radiator-cores. The flattened rectangular or elliptical tubes are inserted in the punched straight fins so as to form a simple core matrix. The fins may be punched or pressed (dimples) at regular intervals to increase the air passage length and to give more turbulances to air-flow.

Experience indicates that the tubular fin type gives close to optimum heat-transfer performance, is light and compact and yet adequately strong.

Almost from birth of automobile, radiators were manufactured out of copper and its alloys as copper has the formidable functional advantages such as good heat-transfer characteristic, non-corrosive, easily worked and is easy to solder. In olden days the red metal was plentiful and cheap, but since the second world war it has become scarce and costly. Extensive work has been carried out and two metals, that is, steel and aluminium are worked out successfully as the substitutes for copper and its alloys. The main difficulties in adapting these materials have been the corrosion problem, low heat-transfer characteristic and different set up of manufacturing process.

*Steel radiators*: Steel radiators can be manufactured with the same equipments as required for copper. Solder-coated or copper-coated steel strips are used in the manufacture of fins and tubes. Solder-tin-coated steel sheets are used to press the top tank, bottom tank etc. Steel components can be soldered/brazed with the same techniques as of copper and brass. Addition of suitable corrosion inhibitor is also suggested to overcome the corrosion problem.

It is to be understood that anti-corrosion precautions are necessary only during storage. Once the radiator is installed and is in operation, chances of oxides being

---

*Mr Kulkarni is assistant rketing manager, Bharat diators Private Ltd, Bom- .*

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rmed are very remote due
continuous circulation of
ater at high temperature
d lack of oxygen in the
stem.

While replacing copper
diators by steel radiators
e main problem was of
hieving requisite rate of
at dissipation with the
me frontal area and weight.
new designs were thought
and nowadays steel radia-
rs are made of the McCord
pe or tubular fin type de-
gns with slits, waves, jog-
es and steps stamped on
s and with high pressure
aling caps, which give near-
the same rate of heat-dissi-
tion as that of copper radi-
or, within same frontal area
d weight.

Steel radiators are now in
de use all over the world.

*Aluminium radiators*: The
vantages of aluminium are
at it is available in plenty,
quite low price, and is
ht in weight. The weight re-
ction is by about 40 per cent.
e rate of heat treatment of
uminium is second highest
d so the necessary rate of
at-dissipation could be
hieved without major
anges in the design. The
y problem in the manufac-
re of these radiators is that
complete set-up of the
nufacturing process is
ferent from the conven-
nal set up for copper/brass
liators.

A typical aluminium radia-
production cycle can be
mmarised as follows: (i)
e-clean and degrease tubes,
s and header-plates; (ii)
emble fins, tubes and
ader-plates in assembly
tures; (iii) pre-heat core-
embly to 1020°F; (iv) im-
rse in dip-brazing molten
k bath; (v) drain; (vi) dip
hot water, acid and rinse
h hot water; (vii) hot air
r; (viii) arc weld tanks
l mountings with pre-at-
hed fittings to headers;
) pressure test, repair and
est; and (x) paint.

enerally the McCord type
ign is preferred in the
nufacture of aluminium
iators, but the tubular fin
e design is also equally
suitable. At present about 2,50,000 cars are fitted with aluminium radiators.

*Pressurised radiators*: The cooling efficiency of a radiator increases with the increase in the temperature difference between the hot-coolant and cooling air. The temperature of hot coolant can be raised by increasing the boiling point. Pressurisation, which is simply regulated by the radiator cap, raises the coolant's boiling point and increases the efficiency of the water-pump. Higher pressure operation increases the efficiency of engine, which may economise the consumption of fuel.

With the use of 13 psi or 15 psi pressure caps, economy can be achieved by reducing the numbers of tubes or fins.

*Super-heat radiators*: This is an improvement on the 'pressurised' system. A new 'superheat-type' radiator has been designed and may come into production soon. This will operate at 293°F and 30 psi pressure. A new copper alloy has been developed for this radiator. The alloy has 90 per cent more conductivity than pure copper. The solder developed for this is of Pb-Sn-Zn type which can stand higher temperatures and stresses. The soldering is done by thermotool process.

Designers are aiming at a radiator which is completely sealed, in which steam will be the coolant instead of water. There will be no need to change the coolant at least for two years. Making the radiator leak-proof may be a problem, but the designers think that it can be overcome without much difficulty.

*Introduction of auxiliary tank or surge tank*: Circulation of coolant is seriously impaired by the entrainment of air in the coolant. The aeration can lead to improper cooling, corrosion, premature failure of engine parts or loss of the engine itself. After studying the various causes for aeration it is concluded that either the auxiliary tank or surge tank should be introduced along with the radiator to avoid aeration. With this arrangement, air is replaced by coolant from the auxiliary tank through the in-between connections and so

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the top tank is always full with the coolant.

Since there are occasions where there is insufficient room to mount an auxiliary tank, which may also be costly, cumbersome and susceptible to damage, another solution is to build a surge tank into the radiator top tank itself.

*Cross-flow radiator*: In conventional radiators, the top tank is on the top side and the bottom tank on the bottom side of the core, but in cross-flow radiators side tank system is used, permitting a virtually square core area. Consequently, the fan sweeps almost the entire core, resulting in reduced fan horse power for improved fuel economy and extended belt life.

Another innovative feature of this system is powered deaeration which removes potentially damaging air bubbles from the coolant in less time than the conventional down-flow system.

In India most radiator manufacturers make tubular fin type radiators. Some of them also manufacture McCord type radiators. Honeycomb type design is n obsolete.

At least 3/4 manufactur in India tried steel-radiat and now all of them regula supply steel-fin/brass tu radiators. Complete st radiators will be manufact ed in India only after inc porating some improv methods of production so th these radiators would be co pletely free from corrosi during the manufacturi process. At the Central Ell tro-Chemical Research Ins tute, Kanaikudi research being done on inhibitors steel-radiators.

It is of interest to note th the industry has develop brass-fin/brass-tube radiato which give the same efficien as copper-fin/brass-tube ra ators. With brass-fin radiat there will be some saving copper material. In India 7 p 9 psi and 13 psi sealing-ca are more common than psi conventional sealing-ca With this change it was p sible in some cases to u smaller capacity radiators certain vehicles with so saving in copper material.

Skilled soldermen/tinsmi are not readily availab To get finished raw mat rials (copper and brass str and sheets and solders) of d sired specifications is also problem. A variety of oth problems are also being fa ed by radiator-manufacture but the picture is not gloomy.

About 1,70,000 radiators a radiator cores are requir annually in India as origin equipments and spare-par There are about 15 radiat manufacturers in India.

The marketing of radiato is not very different fro that of other automobile anc laries. The outlets are fair well-distributed througho the country.

For optimising the benef and lessening the hardship the vehicle-owner, manufa turers—big or small—shou take an ethical approach the entire operation. The go ernment in its turn shou help the radiator manufa turer by relaxing th stringencies.

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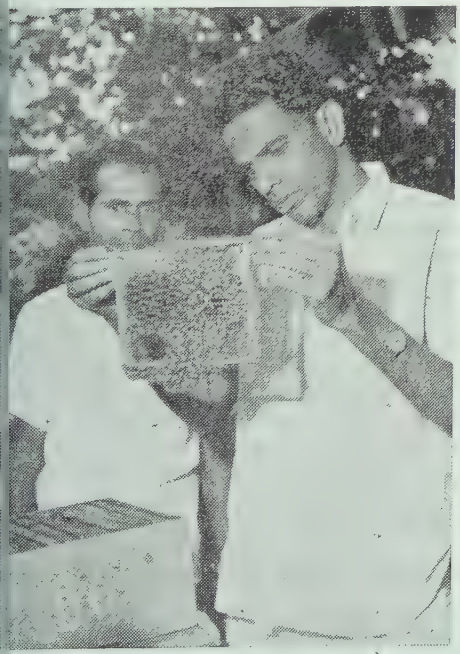
*This is the twelfth feature on khadi and village industries*

# ee-keeping industry

COMMERCE FEATURE

TRACTION of honey from beehives and its various uses have been wn in India for centuries. However, ntific rearing of bees and modern nods of extraction of honey were paratively unknown in India till ntly. In fact, a beekeeping industry loped on modern lines can play a positive role in raising the output gricultural and horticultural crops merely increasing the production oney and wax. This aspect is not ell known in India. In the develop- ountries like the USSR and the US, s been estimated that the value of increase in crop yields, as a result ne cross-pollination effected by the is ten times more than the com- d value of honey and wax produced. , the development of the beekeeping industry in the modern context has to be viewed as an integral part of the measures for agricultural development.



e-keeper examining the bee colony

It is also important to note that honey is a nutritious and wholesome food. It contains some precious and rare natural nutritional elements, the substitutes of which are difficult and costly to manufacture. Honey, a natural sugar, is composed of moisture (20 to 25 per cent), dextrose (30 to 35 per cent), levulose (35 to 40 per cent), sucrose (2 to 5 per cent) and ash or minerals (0.1 to 0.5 per cent). Appreciable amounts of vitamins 'C' and 'B', thiamin, riboflavin, pyrodozin, pentothenic acid and niacin are also present in it. It has traces of one of the rarest vitamins, namely, vitamin 'K', which prevents haemorrhage. In terms of energy, one kg of honey gives over 3,500 calories. This is equivalent to about 65 eggs, 5 litres of milk, 10 kg of green peas, 12 kg of apples or 20 kg of carrots. Thus honey can be used as a basic nutritional ingredient of any programme for increasing the nutritional standards of the rural population.

Bee-wax and royal jelly which are the other products of the beekeeping industry have medicinal and industrial uses.

A major part of nature's bountiful supply of flora goes waste at present. Through scientific development of the beekeeping industry this valuable resource can be harnessed for increasing the output in agriculture and that of honey and wax in areas where there are good floral pasturage and nectar flow. A reasonably strong bee colony (one bee box with a queen bee and about 12,000 to 15,000 worker bees with a few drones) can yield 3 kg to 5 kg of honey and fetch a net income of Rs 10 to Rs 15 per annum. Beekeeping is thus an excellent hobby providing some supplementary income, if only one could spend part of one's spare time for tending the bees and for extracting honey. It can also be pursued as a full-time occupation, by keeping a large number of bee colonies which can fetch one an annual income up to Rs 5,000.

## The industry under the Khadi and Village Industries Commission

The Commission propagates the development of the beekeeping industry on scientific and modern lines. Generally co-operative enterprise is encouraged in order to diffuse widely the benefits in the fields of agriculture and horticulture. Improved and standardised (with ISI specifications) bee-boxes and other implements are distributed at subsidised prices to the farmers and others who are interested in beekeeping. Arrangement is made for training in rearing of bees and extraction of honey and assistance for grading, packaging and marketing of honey is also given. In fact, the Commission rightly claims that it is the only agency of its kind in India which strives to develop the beekeeping industry in far and wide areas where there is scope for its development.

Since its inception in 1957, the Commission started assisting the development of the beekeeping industry. Earlier, some state governments and the All India Khadi and Village Industries Board had initiated some work in this direction. However, rapid strides were made in the development of scientific beekeeping only after the establishment of the Commission. It is to the credit of the Commission, that there are at present more than 164 co-operative societies of beekeepers through which over 1,31,000 beekeepers have been assisted. Production of honey also recorded a spectacular increase. On account of the continuous increasing demand for honey and wax, the entire production under the aegis of the Commission is being sold. Table 1 presents some important features of the progress of the beekeeping industry under the Commission.

**Table 1 : Some selected indicators of progress (*a*)**

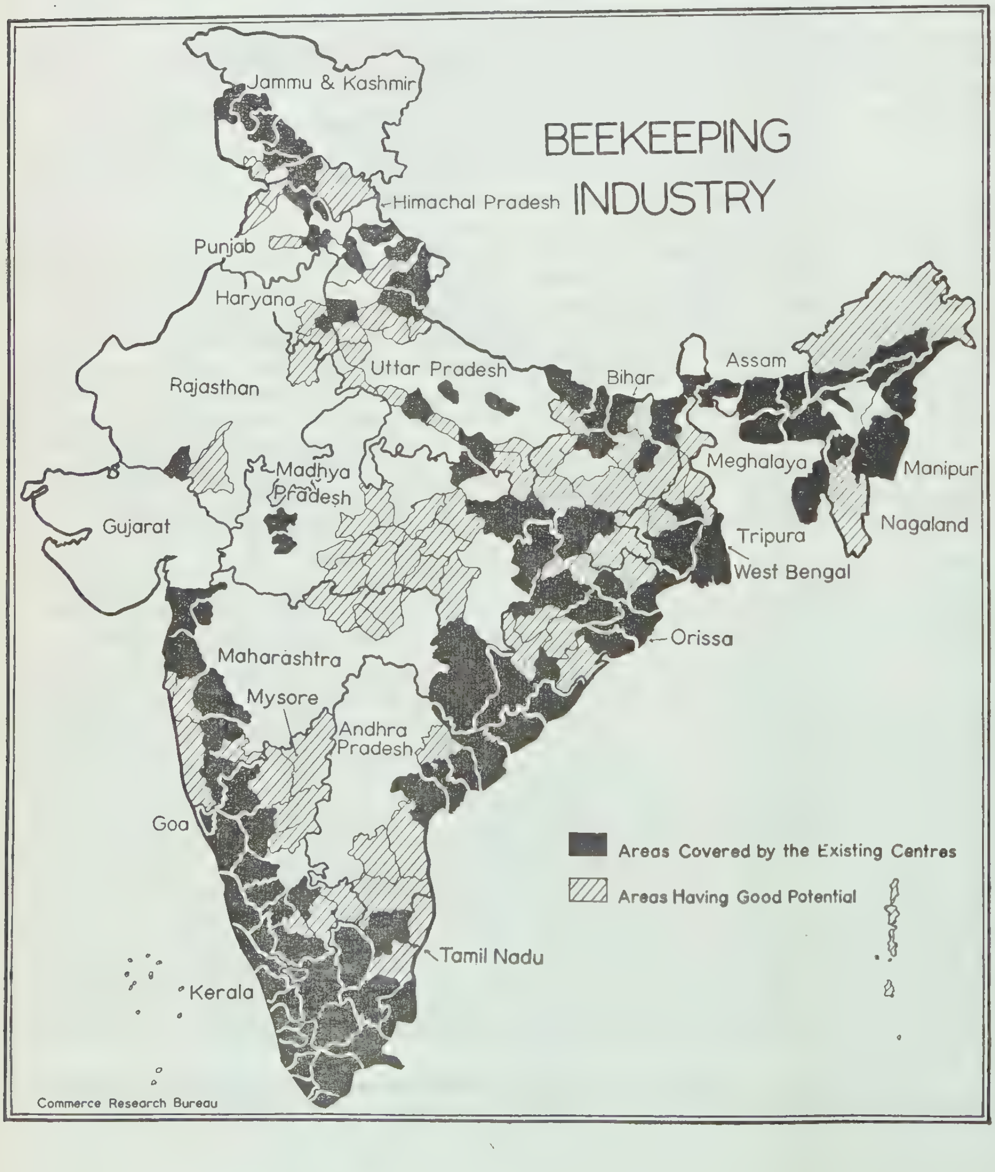
| | 1955-56 | 1960-61 | 1965-66 | 1968-69 | 1970-71 |
|---|---|---|---|---|---|
| I. *Organisation* (Cumulative numbers) | | | | | |
| Co-operatives | N.A. | 122 | 179 | 137 | 164 |
| II. *Production of honey* | | | | | |
| (i) Quantity (lakh kg) | 0.21 | 3.95 | 11.41 | 17.10 | 21.88 |
| (ii) Value (Rs. lakhs) | 1.05 | 19.70 | 57.03 | 102.61 | 131.25 |
| III. *Sales of honey* | | | | | |
| (i) Quantity (lakh kg) | 0.21 | 3.95 | 11.41 | 17.10 | 21.88 |
| (ii) Value (Rs. lakhs) | 1.05 | 19.70 | 57.03 | 102.61 | 131.25 |
| IV. *Employment* (*b*) | | | | | |
| Number of beekeepers (thousands). | 4.6 | 42.7 | 75.3 | 109.5 | 131.6 |

*N.A.*—Not available.

(*a*) These data relate to the programme of Khadi and Village Industries Commission only.
(*b*) All part-time employment only.

## Technological improvements

Continuous research on beekeeping, bee-science and other aspects of organisation and development is encouraged by the Commission. For this purpose, a central research and training institute has been set up at Mahabaleshwar, Maharashtra. In addition, seven regional laboratories have also been established in the areas where beekeeping has been already developed or where there is scope for its intensive development. The activities of these laboratories are being co-ordinated by the central institute. One of the important problems taken up for study at the institute is concerned with the improving the breeds of bees for obtaining higher yields of honey. Experiments conducted so far have shown the possiblity of increasing yields, such increases ranging from 21 to 94 per cent.



Besides, research is also undertaken to improve various equipment used in the industry. So far, among other things, three types of bee boxes have been designed and developed to serve the varying needs of the southern, northern and north-eastern and Himalayan regions. With the assistance of the Indian Standards Institution specifications have been laid down for each of these three types of boxes.

Improvements in other implements for extraction of honey and in the methods of feeding bees, particularly during lean non-flowering seasons and research in cross pollination, are also being carried on. It has been established that, under the Indian conditions, higher yields to the extent of 5 to 22 per cent can be obtained in fruit and vegetable crops and a number of seed crops whose flowers are, in varying degrees, self-sterile in respect of pollen produced on the same plants. These, therefore, need cross-pollination. The cross-pollination effected by bees leads to better seeds than those got through the pollination effected by wind and other insects. The crops benefited most by cross-pollination by bees are orchard crops like apples, oranges and lemons, vegetables like brinjals, melons and cabbages, roots like carrots and onions, seeds like mustard, sesamum and niger, cash crops like cotton and chillies and plantation crops like coffee. In order to help in the extension of these results, model apiaries* and nurseries for bees have been set up with the assistance of the Commission in various parts of the country.

## Production, sales and employment

In 1956-57, when the Commission started functioning, the production of honey was around 60,000 kg and was vorth nearly Rs 3 lakhs. Then about 0,000 beekeepers had been enlisted. Over the next 15 years both the producion and the number of beekeepers reorded very sharp increases. By March 1, 1971, the production of honey had eached the high level of 22 lakh kg alued at over Rs 1.3 crores. A total of ,31,600 beekeepers had been assisted

---

*Places where bee-boxes are kept and scientific bee-keeping demonstrated.

able 2 : **Production, sales and employment** (*a*)

| Year | Production of honey | | Employment ('000) |
|---|---|---|---|
| | Quantity (lakh kg.) | Value (Rs. lakhs) | |
| 954-55 .. | 0.09 | 0.40 | 2.2 |
| 955 56 .. | 0.21 | 1.05 | 4.6 |
| 956-57 .. | 0.59 | 2.95 | 10.3 |
| 957-58 .. | 1.36 | 6.75 | 15.8 |
| 958-59 .. | 2.42 | 12.05 | 33.1 |
| 959-60 .. | 2.70 | 13.45 | 37.9 |
| 960-61 .. | 3.95 | 19.70 | 42.8 |
| 961-62 .. | 5.12 | 25.40 | 46.6 |
| 962-63 .. | 5.68 | 28.10 | 54.6 |
| 963-64 .. | 7.14 | 38.70 | 58.0 |
| 964-65 .. | 10.19 | 50.94 | 66.7 |
| 965-66 .. | 11.41 | 57.03 | 75.3 |
| 966-67 .. | 12.78 | 63.90 | 95.1 |
| 967-68 .. | 14.68 | 74.00 | 105.1 |
| 968-69 .. | 17.10 | 102.61 | 109.5 |
| 969-70 .. | 19.40 | 116.39 | 124.0 |
| 970-71 .. | 21.88 | 131.25 | 131.6 |
| mpound average rate of growth between : | | | |
| 1954 and 1970-71 .. | 60.7 | 70.8 | 29.2 |
| 1956-57 and 1970-71 .. | 66.9 | 31.1 | 20.0 |

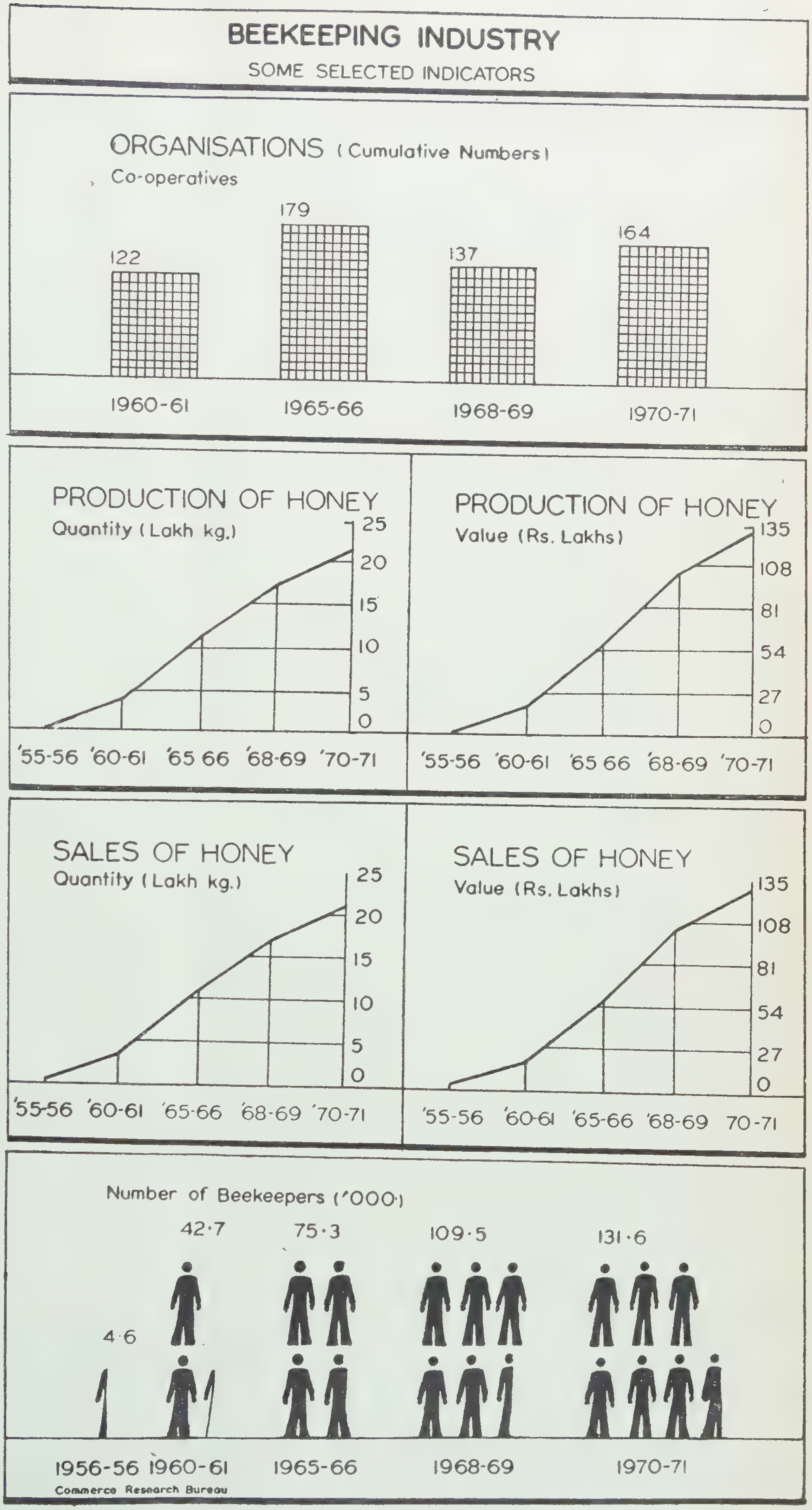
These data relate to the programme of Khadi and Village Industries Commission only.

then. Table 2 sets out the details of oduction, sales and number of beekeeps enrolled during the 17-year period 54-55 to 1970-71.

### sbursements of grants and loans

During the 18-year period 1953-54 1970-71, nearly Rs 2.4 crores had been nctioned for the development of the ekeeping industry. About 92 per cent this assistance comprised grants totalg about Rs 2.2 crores. The remaining 19 lakhs (8 per cent) represented ans. Table 3 shows the year-wise dels of grants and loans given so far.

What a beekeeper needs is a couple bee boxes, a honey extractor and a of minor accessories. He is given ese after some initial training. The mmission through its apiaries and arists, helps the beekeepers to onise these boxes with bees and to ltiply such colonies as and when



Commerce Research Bureau

they desire. Some financial assistance, mostly grants, are provided to them for rearing the bees, extraction of honey and multiplication of the colonies. On the purchase of each bee box and other implements, the Commission allows a subsidy of Rs 15 to Rs 25 or 50 per cent of the price of the box, whichever is less. In backward areas, such as hilly and inaccessible areas, this subsidy is increased to 75 per cent.

In addition to this assistance, some capital expenditure grants are available for the construction of honey houses. Establishment grants are given on a tapering scale for the maintenance of area offices, sub-stations and circle stations which mainly supervise the development of industry in their respective areas of operation. Some help is also given for training school students in beekeeping. Loans at concessional terms are given for marketing, in addition to some working capital for production and contribution to the share capital of co-operative societies.

**Table 3 : Disbursement of grants and loans by Khadi and Village Industries Commission**

(Rs lakhs)

| Year | Grants (additional) | Loans outstanding (cumulative) | Total |
|---|---|---|---|
| 1953-54 .. | 1.11 | 0.25 | 1.36 |
| 1954-55 .. | 2.14 | 0.30 | 2.44 |
| 1955-56 .. | 4.69 | 1.09 | 5.78 |
| 1956-57 .. | 7.94 | 2.28 | 10.22 |
| 1957-58 .. | 9.38 | 2.64 | 12.02 |
| 1958-59 .. | 11.69 | 3.18 | 14.87 |
| 1959-60 .. | 10.64 | 4.18 | 14.82 |
| 1960-61 .. | 9.03 | 6.21 | 15.24 |
| 1961-62 .. | 15.71 | 6.61 | 22.32 |
| 1962-63 .. | 13.78 | 7.95 | 21.73 |
| 1963-64 .. | 19.46 | 10.67 | 30.13 |
| 1964-65 .. | 16.31 | 11.25 | 27.56 |
| 1965-66 .. | 17.41 | 10.53 | 27.94 |
| 1966-67 .. | 18.11 | 12.03 | 30.14 |
| 1967-68 .. | 17.61 | 13.81 | 31.42 |
| 1968-69 .. | 16.36 | 17.23 | 33.59 |
| 1969-70 .. | 12.96 | 18.74 | 31.70 |
| 1970-71 .. | 15.34 | 19.30 | 34.64 |
| Total .. | 219.67<br>(92) | 19.30<br>(8) | 238.97<br>(100) |

## Pattern of financing of grants and loans

An overwhelming proportion of the total grants of Rs 2.2 crores consisted of subsidy for purchasing bee boxes. The grants on this account totalled nearly Rs 1.9 crores (87 per cent) in the past 18 years. About Rs 12.2 lakhs (6 per cent) was spent on the maintenance of area offices, sub-stations and circle stations. Nearly Rs 7 lakhs (3 per cent) represented the expenditure on training. Of the total loans of Rs 19 lakhs, Rs 17 lakhs (89 per cent) were for financing working capital and the capital expenditure loans outstanding constituted Rs 1.8 lakhs or 10 per cent.

## Prospects

India has inexhaustible floral resources provided by its vast natural vegetation and cultivated crops. It is estimated that these existing resources are sufficient to maintain about 10 million bee colonies. If the forage available from these resources is properly exploited through the adoption of migratory beekeeping techniques, it can contribute to an additional production of Rs 30 crores worth of agricultural crops and horticultural products through cross-pollination effected by bees. Further, it would add at least Rs 10-Rs 15 crores to the country's income in the shape of honey, wax and other products and create additional supplementary occupation for about 200,000 persons mostly in rural areas at a minimum annual income of Rs 500-Rs 750 *per capita*.

The demand for Indian honey from abroad is increasing despite its higher price. This is so because in advanced countries the extensive use of insecticides and pesticides, it is reported, has changed the flavour and taste of honey much to the dislike of the consumer. India should encash upon this opportunity for increasing the output of honey and thus earn some valuable foreign exchange by exporting it. Besides this market for honey, there is a growing market, both domestic and foreign, for wax and royal jelly. Through proper grading and quality control, both the internal sales and exports of these products can be substantially stepped up.

Going by the results of the research carried out under the aegis of the Commission, it is clear that in India also, bee-pollination can help raise certain varieties of agricultural production. It is necessary, therefore, that the state agricultural departments are involved in the development of beekeeping industry. All aspects of the development of beekeeping, including the distribution of equipment and marketing of honey, should form an integral part of the state departments' strategy for agricultural development.

The central and state governments have sponsored several programmes for nutritional feeding of children and others. In these programmes, extensive use of honey and its products as food or as supplemental diet should be encouraged. This would give a great stimulus to the growth of the beekeeping industry.

So far, the Commission has assist some schools for introducing beekee ing as a craft and training studen This programme, if extended to cov every school in the villages, will he in training the students of primary a secondary standards in the science beekeeping. These students should encouraged to keep bee boxes at the houses, wherever feasible. Every fami in the rural areas which has some la and a house should be encouraged keep some bee boxes in its kitchen ga den and fields. This would not on help these families to increase the agricultural production but also gi them honey which would fetch som additional income.

An apiary where bee boxes are kept and scientific bee-keeping demonstrated

Intensive propaganda should made about the benefits that beekee ing can give to the growers of fruit plantation crops and oil seeds. Th beekeepers co-operative societies opera ing in these areas should be asked assist these growers.

Bee wax is an important raw mate rial in the manufatcure of amunitio candles, paints and varnishes, mouldin etc. The demand for these products i growing in both domestic and forei markets. It is necessary, therefore, th sufficient encouragement is given increase their production to meet th demand.

Significant progress in the bee-keep ing industry can be achieved, if simul taneous attention is paid to bee forage bee management and bee breeding for in creasing the *per capita* output of hone and reducing its cost. Quality contr measures are also equally important be cause honey being a food item come under the provisions of the Preventio of Food Adulteration Act. For this pu pose, all the producers of honey hav been advised to get their produce Ag marked. The Commission itself give financial assistance for scientific bottling grading and packing and transporting o honey.

# AIPMA: Silver jubilee

—A FEATURE

## lastics: 25 years of progress

**Kantikumar R. Podar**

IANKS to the sustained scientific research and technological ad- ces, the growth of the plastics indus- in all the industrially advanced ntries has been tremendous and sig- cant. Plastics have made sizable in- ls into all sectors of the economy such ndustrial, agricultural and domestic. part played by plastics in success- replacing the conventional mate- and particularly the ferrous and -ferrous metals which are scarce is ming great importance. In fact, ics are now recognised to be one e key materials serving the nation only in times of war but also mes of peace and in promoting bet- iving.

**he silver jubilee of the All ndia Plastics Manufacturers' ssociation is being celebrated Bombay from January 31 to ebruary 5, 1973.**

he people of India who are tradi- lly conservative have taken up to cs in right earnest. The consump- of plastics is increasing every year, h not at the same rate as it is l in the Western countries and . The Indian industry is also play- creditable role in the field of de- by supplying a wide variety of ce stores.

The Indian plastics industry developed after the second world war. The growth of this industry in India during the past 25 years has indeed been very remarkable and in retrospect one can take legitimate pride in the achievements of the industry and the most useful role it has played in the industrialisation of the country. The government of India recognised the importance of this industry in the economy of the nation and have assisted its growth in various ways. During the initial stage of its development on the recommendation on the Tariff Board, protection was accorded to certain sections of the plastics industry. On account of the adverse balance of payments position, imports of finished plastics goods have been greatly restricted.

During the first plan period the plastic processing industry diverted its attention from the manufacture of more utility items to the production of industrial goods such as radio cabinets, telephone receiving sets, containers for pharmaceutical industry, closures for bottles, electrical accessories, insulated cables, nylon brushes and gear, packaging film, frames, umbrella handles, etc. The second plan with its emphasis on rapid industrial development of the country provided a good opportunity for plastics industry to continue and step up production of many more industrial items and also find out new outlets for applications of plastics.

As a result of building up of a sizable demand various projects were licensed during the second plan period for the manufacture of important plastics raw materials. The target fixed by the Planning Commission for the production of plastics raw materials during the second plan period was as under:

| | *1955-56* | *1960-61* |
|---|---|---|
| Capacity (tons) | 1,180 | 12,810 |
| Production (tons) | 725 | 10,600 |

The second plan achievement of the industry was as follows:

| *Year* | *Production in tonnes* |
|---|---|
| 1956 .. .. .. | 2,206 |
| 1957 .. .. .. | 2,632 |
| 1958 .. .. .. | 1,541 |
| 1959 .. .. .. | 2,131 |
| 1960 .. .. .. | 10,210 |

The Planning Commission's programme of development of the plastics raw material manufacturing industry during the third plan envisaged production capacity of about 85,000 tonnes by 1966-67.

The performance of the industry during the third plan period is shown below:

| *Year* | *Production in tonnes* |
|---|---|
| 1961 .. .. .. | 12,745 |
| 1962 .. .. .. | 17,628 |
| 1963 .. .. .. | 20,328 |
| 1964 .. .. .. | 29,307 |
| 1965 .. .. .. | 37,189 |
| 1966 .. .. .. | 36,556 |

The industry was not able to achieve even 50 per cent of the target fixed for the third five-year plan. During this period, the nation faced two armed conflicts, one with China and the other with Pakistan. It also had to undergo untold hardship due to two consecutive failures of monsoon. This resulted in paucity of foreign exchange and the consequent slow-down in overall industrial activity. Severe restrictions were imposed on imports of not only plastics raw materials and basic chemicals but also on imports of processing machi-

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*Ir Podar is chairman of the Silver ee Celebrations Committee of the ndia Plastics Manufacturers' Asso- n.*

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AIYARS: PIL-127

**Production of plastics raw materials: 1967-71**

(In tonnes

| Raw material | 1967 | 1968 | 1969 | 1970 | 1971 |
|---|---|---|---|---|---|
| .F. moulding powder . .. .. | 3,750 | 4,620 | 4,950 | 5,330 | 6,500 |
| F.*M.F. moulding pwder .. .. | 1,380 | 1,620 | 1,540 | 1,660 | 2,000 |
| olystyrene .. .. .. .. | 5,600 | 6,740 | 9,400 | 9,300 | 11,000 |
| olyethylene L.D. .. .. .. | 9,750 | 15,660 | 18,700 | 23,000 | 28,000 |
| olyethylene H.D. .. .. .. | .. | 7,980 | 17,350 | 18,350 | 24,000 |
| .V.C. Resins .. .. .. .. | 13,600 | 17,560 | 34,400 | 38,700 | 42,500 |
| .A. Moulding Powder.. .. .. | 480 | 854 | 1,150 | 1,050 | 1,100 |
| olyester Resins .. .. .. | 244 | 284 | 334 | 378 | 400 |
|  | 34,804 | 55,381 | 87,824 | 97,768 | 1,15,300 |

ry and equipment. The implementa-
n of raw material projects were also
nsiderably delayed. The industry ex-
rienced acute shortage of three major
ermoplastics, such as polystyrene,
ethylene and polyvinyl chloride.
duction of thermosetting materials
also adversely affected by frequent
tages of basic chemicals such as
haldehyde, phenol and hexamine.
r increasing incidence of excise levy
36 per cent *ad valorem* severely
ted the industry and pushed up the
es of indigenous raw materials.

Plasticisers required for compound-
PVC and cellulose acetate are also
uced in the country. Production
lasticisers during the last five years
as under:

| | | |
|---|---|---|
| 1966 | .. .. .. | 1,827 tonnes |
| 1967 | .. .. .. | 3,130 tonnes |
| 1968 | .. .. .. | 6,000 tonnes |
| 1969 | .. .. .. | 8,699 tonnes |
| 1970 | .. .. .. | 9,568 tonnes |

The commissioning of two petro-
ical complexes—that of National
nic Chemicals Industries Limited
Union Carbide Ltd—marked a mile-
in the history of the plastics in-
y. The NOCIL complex has capa-
to crack 22.5 lakh tonnes of
ha and capacity to produce many
rtant chemicals such as ethylene
0 tonnes), benzene (14,000 tonnes),
lene (35,000 tonnes), vinyl chlo-
(30,000 tonnes), PVC (20,000 ton-
and so on.

With the availability of basic che-
s from petrochemical sources, the
of plastics raw materials, parti-
y thermoplastics materials such
lystyrene, polyethylene and PVC
er size of naphtha crackers and should have shown a downward trend. Even so, the prices obtained in India are on a very high side compared with international prices. This price difference is largely due to comparatively heavy incidence of excise duty at the rate of 36 per cent *ad valorem.*

The plastics industry is in the vanguard in the field of exports among non-traditional items. The export performance since 1963-64 is indeed commendable as can be seen from the following:

| *Year* | | *Value of exports (in lakh rupees)* |
|---|---|---|
| 1963-64 | .. .. | 264.33 |
| 1964-65 | .. .. | 318.67 |
| 1965-66 | .. .. | 270.00 |
| 1966-67 | .. .. | 377.04 |
| 1967-68 | .. .. | 329.38 |
| 1968-69 | .. .. | 619.40 |
| 1969-70 | .. .. | 873.27 |
| 1970-71 | .. .. | 875.71 |

The tempo of growth in exports has recently slackened due to non-availability of required imports such as various grades of raw materials and sophisticated processing machinery. If adequate imports are provided the exports may reach about Rs 50 crores by 1975-76.

The recent years have witnessed considerable progress in the indigenous manufacture of processing machinery and equipment. Standard types injection machines up to 40 oz capacity are already being produced in the country. Similarly, extruders upto 4½" capacity are available indigenously. Manufacture of standard type blow moulding machines has also been recently undertaken.

As per the census of machinery tools, conducted by the government of India in 1968, plastics machines installed in the country up to 1968 was as under:

| Types of machines | Indigenous | Imported | Total |
|---|---|---|---|
| Injection moulding machines .. .. (Manually operated) | 2,064 | 36 | 2,100 |
| Injection moulding machines .. .. (Automatic) | 221 | 334 | 465 |
| Extruders .. .. | 399 | 180 | 579 |
| Others .. .. .. | 830 | 251 | 1,081 |
| Total .. | 3,514 | 801 | 4,315 |

The Planning Commission has formulated the requirements of plastics raw materials as shown below for 1973-74 and 1978-79:

| Product | Estimated requirements | |
|---|---|---|
| | 1973-74 | 1978-79 |
| 1 | 2 | 3 |
| 1. PVC resins .. .. | 80,000 | 1,75,000 |
| 2. Polyolefins | | |
| (*a*) Polyethylene (LD) | 58,000 | 1,50,000 |
| (*b*) Polyethylene (HD) | 23,000 | 45,000 |
| (*c*) Polypropylene .. | 7,000 | 15,000 |
| 3. Polystyrene and its copolymers .. .. | 35,000 | 70,000 |
| 4. Acrylic resins .. | 5,000 | 10,000 |
| 5. Cellulosics | | |
| (*a*) Cellulose acetate moulding materials | 5,500 | 7,000 |
| (*b*) Cellulose nitrate .. | 1,500 | 2,000 |
| 6. Phenolic resins .. | 13,000 | 22,000 |
| 7. Phenolic moulding materials .. .. | 6,500 | 9,000 |
| 8. Melamine formaldehyde moulding materials . | 1,000 | 2,000 |
| 9. Urea formaldehyde moulding materials . | 3,500 | 7,000 |
| 10. Urea formaldehyde resins adhesives .. | 12,000 | 24,000 |
| 11. Polyester resins .. | 1,400 | 3,200 |
| | 2,52,400 | 5,41,200 |

The Indian Petrochemical Corporation, a public sector concern, is going ahead with its plan to set up plants at Koyali for the production of polypropylene (30,000 tonnes) and l. d. polyethylene (40,000 tonnes). A private sector unit is also moving ahead to set up downstream facilities under Koyali Petrochemical complex to manufacture 40,000 tonnes of l.d. polyethylene.

With the realisation of the Koyali Petrochemical complex, it may not be difficult to achieve the fourth plan target. But considerable spadework should start immediately to set up further

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ge petrochemical complexes so as to hieve the production target of 1978-79.

Despite many initial handicaps and pediments, the growth of the plastics lustry during these 25 years has in- ed been impressive. The industry uld, perhaps, have taken greater ides but for the frequent shortage of v materials and processing machinery which were dictated primarily by the balance of payment situation. During the seventies, with the realisation of various raw materials projects under the petrochemical complexes at Koyali, it is hoped that a bright future awaits all those in the plastics industry providing vast opportunities for diversification in various lines of manufacture. □

# lurdle of raw material hortage

## M. P. Taparia

HE world is today passing through a "plastic era" with the multifarious plications of plastics in almost all ds of life such as industrial, agricul- al, building, domestic and so on. The wth of the plastic industry was so y rapid that within a short span of decades the industry has established usability and even superiority to er conventional materials such as el, rubber, glass, wood and porcelain. impact of the second world war ated acute scarcity of the conven- hal materials and, in their search for stitute materials, man invented stics. By virtue of the special proper- they possess, plastics are being ex- sively employed on their own right. ng man-made the qualities and appli- ons of plastics can be tailored to et the specific and exacting require- nts of any industry.

The Indian plastics industry has le remarkable progress during the few years. Many applications which e once considered as only war-time stitutes have now proved far superior he conventional materials. The use application of plastics are spread r a wide range and they have already nd their way in some form or the er practically in all the industries h as electrical, radio, telephone, tele- on, engineering, aircraft, ship- ding, refrigeration, packaging, auto- oile, pharmaceutical, chemical and so In addition they are used in the ufacture of a number of consumer utility items such as toilet requisites, e-ware, toys, hand bags and travel isites.

Plastics proved ideal packaging erial because of the special proper- they possess. The low moisture transmission, easy exchange of oxygen and carbon di-oxide, toughness, flexibility, non-toxicity and freedom from odour have made polyethylene bags ideally suitable for packaging.

Agricultural field is another area where plastics have extended their significant contribution. Apart from being used for various agricultural implements, they are applied for other agricultural operations as well. Black polyethylene film is used to substitute the "mulching process" by which the soil surface is covered with compost, leaves, etc, to protect roots of the plants. Black polyethene cover has been used to store 3 million tons of foodgrains during last two years to overcome shortage of godown space. This method of storage has proved very cheap and quicker.

Although the Indian plastics industry has advanced considerably extending its contributions to many spheres, it has suffered a severe setback during the last one year or so due to lack of growth in the production of many raw materials such as low density polyethylene, high density polyethylene and Polyvinyl Chloride (PVC). The impact was so injurious to the industry that a large number of newly established processing units all over the country could not start operation. The production of old established units was also affected adversely. Some of them were more unfortunate as to go out of business due to non-availability of basic raw materials. The association has already made representation to the various government authorities, highlighting the gap between the demand and the supply and how adversely the lack of growth in raw material production is affecting the industry. It is of course heartening to note that some efforts are being made in this direction by the government to mitigate the hardship of the plastics industry.

Because of the non-availability of the raw materials in the desired quantities to feed even the existing machinery at their full capacity there is a natural reluctance on the part of processors to expand their capacity and new entrepreneurs to enter in this line with the ultimate result that the offtake of the plastic machinery has also shown a downward trend. Since the beginning of last year the machinery manufacturers are struggling very hard to keep their production going. Some of the machinery manufacturers are, in effect, producing only about 30 per cent of their installed capacity.

The present installed capacity for the manufacture of thermoplastic raw materials is estimated at 1,32,500 tonnes per annum as detailed below:

(In tonnes)

| | No. of units | Total capacity tonnes per year |
|---|---|---|
| 1. Polystyrene .. .. | 2 | 17,500 |
| 2. Low density polyethylene .. .. | 2 | 30,000 |
| 3. High density polyethylene .. .. | 1 | 24,000 |
| 4. Polyvinyl chloride .. | 5 | 58,000 |
| 5. Cellulose acetate .. | 2 | 3,000 |
| | 12 | 1,32,500 |

As against the installed capacity of 1,32,500 tonnes the manufacturers produced in 1972 about 1.22 lakh tonnes of materials of all types whereas the installed processing capacity during the year is around 1.5 lakh tonnes. It would thus be seen that the gap between the demand and actual supply of raw materials was to the tune of 28,000 tonnes at the end of 1972 and that even if the manufacturers continuously produce at the full installed capacity, they will not be able to meet the present need of the processing units. Over and above the materials required to feed the existing processing units, the additional materials required to keep the machinery manufacturing industry going at 80 per cent of the installed capacity comes about 20,000 tonnes per year. Leaving aside the shortage as at the end of 1972, the quantities of raw materials required every year for the next three years so that the new machines produced can be put to use are as follows:

| | |
|---|---|
| 1973 .. .. | 50,000 tonnes |
| 1974 .. .. | 70,000 tonnes |
| 1975 .. .. | 1,90,000 tonnes |

The plastics industry which includes raw material manufacturers, processing units and machinery manufacturers has

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*Mr Taparia is president of the All a Plastics Manufacturers' Associa- Bombay.*

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ome to play a very significant role in he Indian economy. In fact plastics is onsidered a material of the future hich has unlimited scope for more and ewer applications particularly in a ountry like India, which is importing rge quantities of non-ferrous and fer- ous materials, many of which can be dvantageously replaced by plastics. It , therefore, in the interest of the ation that the industry not only main- ins the tempo of progress but also im- roves upon it.

The plastics processing industry in dia has largely grown as a small-scale dustry, and there are now about 2,200 nall-scale units and a few medium-scale nits employing about 1,50,000 persons rectly with a turnover of Rs 120 crores r annum. Such a phenomenal growth small-scale units has been possible be- use the plastics processing units meet ith all the requirements of the small- ale industry.

(a) A plastic processing machine is industry by itself. All that it needs either a mould or a die to be ready go into production. Thus, the space quired is quite small, and so is the pital requirement.

(b) It can be conveniently located ar the consuming centres, because its quirements of electric power as well manpower can be easily met in any rt of the country. It is thus quite in e with the avowed policy of the gov- nment of dispersal of industries away m large cities.

(c) Because of low initial invest- ent and easy location anywhere in the untry, it is an ideal industry for the ucated unemployed, to start with the ancial help, which is now available m the nationalised banks.

Some of the plastics goods are mparatively cheaper than their nventional counterparts made of her materials. For instance, PVC otwear is appreciably cheaper than ther or rubber footwear and nce has come within the reach millions of people in the low come groups who had to go barefoot cause of expensive leather footwear. e PVC footwear therefore recorded a ry high rate of growth in a short span five years. There is still considerable pe for further growth, because even w millions in India go barefoot.

Similarly, the household ware like ckets and containers are more elegant d helped in improving the quality of . Here again, there is great scope for pansion of the processing industry to et the unfulfilled demands of several llions of low-income group population.

Plastics are replacing metals in many areas, and as newer and stronger types of plastics materials are being developed, more and more industrial components, which at present are being made out of sheet or costly non-ferrous metals, can be made from plastics. This trend has already started in the industrial advanced countries. For a country like India, which is so short of foreign exchange, and which has to import most of its requirements of non-ferrous metals at a considerable cost of foreign exchange, plastics can provide valuable substitute and save the scarce foreign exchange.

The potential for export of plastics processed goods as well as plastics machinery is also quite appreciable, particularly, in the surrounding South East Asia, African and West Asian countries. Some machinery has already been exported even to developed countries like Australia. A further push to export efforts will be possible only if the plastic processing industry is not faced with any problem of shortage of raw materials and the machinery manufacturers are not threatened with depleted order book. In order to be able to compete in the world markets for plastics machinery, it is vital for the machinery manufacturers to develop their technology and bring it up to the level comparable with developed countries like Japan which are manufacturing machinery of high quality and selling abroad at very competitive prices. Development of such advanced technology is possible only if the machinery manufacturers have reasonable growth of domestic market.

The demand for plastics processing machinery depends on the following factors: (a) expansion of processing capacity by the existing units to meet increased demand for their products; (b) establishment of new processing units by new entrants in the field; (c) new applications of plastics goods made either from the traditional markets or new materials; and (d) replacement/ modernisation of outdated machines.

To become operative, all these factors depend on the free availability of the required raw materials at a low price. It is well known that the demand for plastic goods for various end uses such as industrial components, packaging, household ware, pipes and building construction can grow very fast if there is abundant availability of raw material at a reasonable price. If the production of plastic raw materials is planned on a large scale, the indigenous prices can come down substantially. Low prices of plastic raw material will not only help the consumers in getting plastic goods at cheaper price but will have a salutary effect on the prices of products made out of other conventional raw material which can be conveniently substituted by plastic goods.

The following measures are suggested to overcome the present and future shortage of raw materials:

1. All the existing units manufacturing LDPE, HDPE, PVC and PS have reached their full rated capacity or are in the process of reaching full capacity. Many of these units would be in a position to increase their capacity in the shortest possible time, and at the minimum cost. It is therefore suggested that these units should be encouraged to expand their existing manufacturing capacity to optimum capacity based on time-bound programme.

2. In view of the continuing shortage of raw materials it has become very necessary to expedite the Koyali Petrochemical complex and its down-stream units so that more plastic raw materials become available as soon as possible. It should be possible to implement this project on an emergency basis and complete it earlier than planned. The Koyali complex is expected to produce 1.1 lakh tons of plastic raw material per annum. The present world market of plastics is very strong and is hovering around $320 per ton. If we can cut the implementation time by one year we will save $35 million foreign exchange on account of plastic raw material alone. The saving is fabulous. The reward is worth the effort.

3. There is considerable time-lag between planning and implementation of petrochemical complex. The National Development Council has tentatively quantified the requirement of plastic raw material by the end of the fifth and sixth five-year plans. Advance steps should be taken even in the last year of the fourth five-year plan to establish further capacities so that compound rate of growth in production of plastic raw material is maintained year after year.

Also, ideological preferences which envisage a dichotomy between the public sector and the private sector for establishment of raw material production capacity should go. The government should think of only one sector—the national sector. Every effort must be made to encourage establishment or expansion of facilities irrespective of public, private or joint sector on the basis of economic efficiency and managerial competence. ☐

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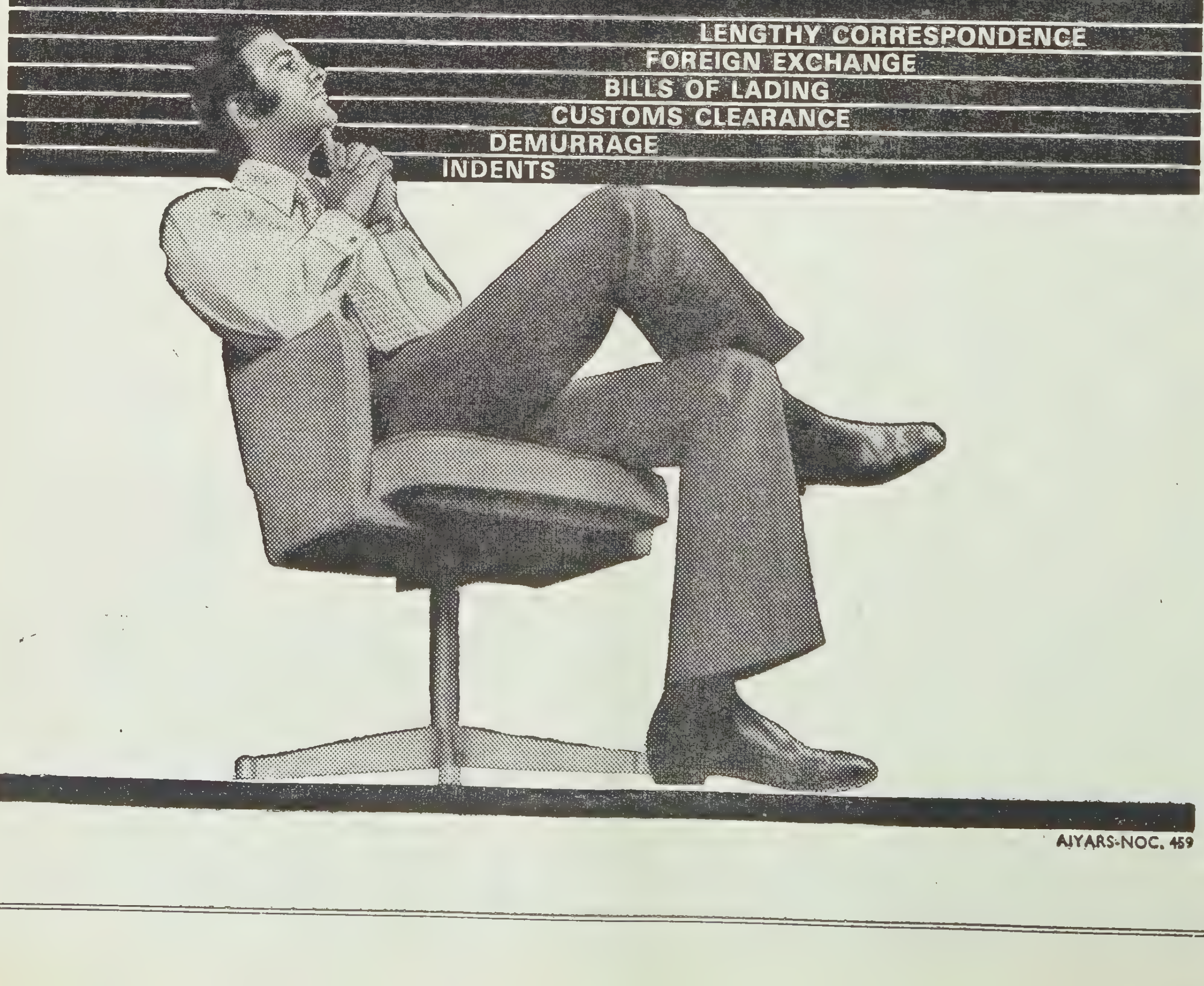

AIYARS-NOC. 459

# Cosmetics and perfumery

—A FEATURE

## osmetics: Need for consumer rotection

**D. J. Ribeiro**

IE discovery of the Kohol pots in the excavations Mohenjo-Daro (circa 1350 has placed India among early users of cosmetics. hose ancient times use of netics was a part of ritual nas been immortalised in rock carvings of Khaho and Konarak and the coes of Ajanta and Ellora. transition from the rituac cosmetics to modern isticated make-up aids been an easy one as the an mind has been conditioned to the ritualistic nting.

ith rapid industrialisa and the consequent rise the standard of living, the shift to urbanised munities, it is obvious cosmetics will find a fast growing market. The western type of cosmetics made their appearance on the Indian market on an "off the shelf" basis at the beginning of the 20th century, mainly imported from the UK. It was only towards the end of the first world war that a beginning was made towards the establishment of an indigenous industry. The industry reached the take-off stage only during the second world war, when imports became almost impossible because of shipping and other difficulties. The attainment of independence with its *swadeshi* philosophy did give a fillip to the industry, but it was the virtual ban on the imports of cosmetics in the early fifties that established the industry. Today the industry has an estimated production of Rs 25 crores with an annual growth of 15 per cent. This figure does not take into account the unorganised sector that contributes a further 50 per cent of this value. The industry has exported cosmetics worth Rs 1.36 crores during April-November 1972 which ould be projected to Rs 2 crores for the year. Not a mean performance for a young industry and that, too, in a non-traditional item of export.

The industry has gained considerably from international cosmetic houses which had set up businesses in this country, thereby raising the standard and widening the range of cosmetic items. Besides the branded, established product there exists a flourishing trade conducted by the cottage industry which is protected by the government by way of remission of excise duties and lower licence fees. The rapid growth of this sector, often in unsanitary conditions and in an unethical atmosphere, has caused concern to the ministry of health, with the result that the Drugs Act, 1940 had to be suitably amended to bring cosmetics under its purview. More often than not, it is part of this sector that is responsible for the manufacture of adulterated, spurious and mis-branded cosmetics that periodically flood the market. The growth of the industry has been so rapid that the government, quick to note a possible source of revenue, imposed levies totalling 30 per cent *ad valorem*.

The development of the industry is to a great extent dependent on the development of ancillary industries covering the manufacture of equipment, packing materials and raw materials.

Most equipment required for the industry could be made available from indigenous sources, and today we have a variety of mixers, blenders, sifters, pulverisers,

**Production of cosmetics and toiletries : 1965-1971** (Tonnes)

| | Talcum powder | | Face powder | | Face cream and snow | | Tooth paste | | Tooth powder | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Capacity | Production | Capacity | Production | Capacity | Production | Capacity | Production | Capacity | Production |
| 5 .. .. | 2,461.9 | 4,746.7 | 725.5 | 293.3 | 1,481.9 | 774.7 | 4,463.8 | 3,124.2 | 804.2 | 300.3 |
| 6 .. .. | 2,461.9 | 4,471.8 | 725.5 | 360.4 | 1,481.9 | 855.4 | 4,463.8 | 3,141.6 | 804.2 | 339.6 |
| 7 .. .. | 2,461.9 | 6,592.3 | 725.5 | 331.0 | 1,481.9 | 689.6 | 4,463.8 | 2,610.0 | 804.2 | 364.8 |
| 8 .. .. | 6,428.0 | 3,772.8 | — | 397.2 | 1,133.0 | 780.8 | 4,051.2 | 2,655.6 | 1,058.9 | 347.1 |
| 9 .. .. | 6,428.0 | 3,612.3 | — | 31.8 | 1,133.0 | 659.8 | 4,051.2 | 2,842.8 | 1,058.9 | 314.1 |
| 0 .. .. | 6,428.0 | 3,491.8 | — | 14.2 | 1,133.0 | 753.0 | 4,050.9 | 4,864.0 | 1,058.9 | 488.0 |
| 1 .. .. | 6,428.0 | 3,543.0 | — | 53.1 | 1,133.0 | 848.0 | 4,050.9 | 5,033.0 | 1,058.9 | 815.0 |

SOURCE : 1. Central Statistical Organisation, Department of Statistics, *Monthly Statistics of the Production of Selected Industries of India, various issues,* Calcutta.
2. Ministry of Industrial Development, Annual Report, various issues, New Delhi.

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*r Ribeiro is technical ager, Lakme Ltd, Bom-*

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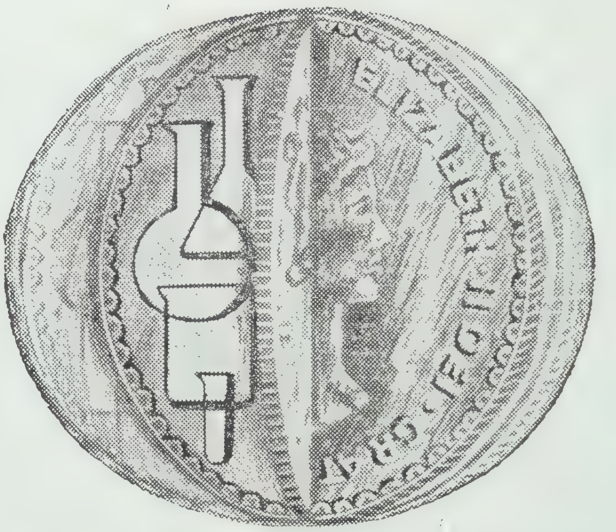

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omogenisers available in andard models which, if eed be, could be custom- ade to buyers' specifications. is only in the range of phisticated packaging uipment such as accurate belling machines, carton bricating machines and gh volume packaging equip- ent that we face a problem. ıt these machines, too, uld be designed and fabri- ted locally, based on a clear change of ideas between e user and the engineers.

In the field of packaging aterials, the picture is far om rosy, and that too in an dustry whose marketing ilosophy is based on the iom "the product should ll on sight". It is the poor ality of packaging that is lding back the develop- ent of the cosmetic industry d is definitely hampering r export drive. Foreign yers while approving the quality of the cosmetic product, have severe criticism to offer on the quality and eye-appeal of the packaging. It is difficult, if not impossible, to obtain glass containers free from flaws or air bubbles and in designs and shapes conducive to cosmetic packaging. In metal containers, too, tin plates are usually in short supply and even when available in restricted quantity, the quality is not amenable to high-grade printing.

Aluminium which is plentiful in the country is today priced out of the market due to high excise levies on aluminium containers. The plastics industry, however, holds out high hopes for the packaging of cosmetics. With imagination, it is possible to obtain plastic containers in a variety of designs and shapes and in any colour of one's choice. Plastic containers, however, have to be used with caution, as most plastic materials pose a compatibility problem and are susceptible to perfume loss by permeation. The choice of plastic materials available in the country is limited and the cost of locally manufactured plastics is much above international prices. Packaging materials available are comparatively more expensive than in advanced countries, who have the advantage of cheaper raw materials and lower conversion costs due to high-volume automated machines. It is hence extremely difficult to compete in international markets with low-grade packaging materials which are obtained at high prices.

By and large, the bulk of raw materials used by the industry are available locally in the required quality and quantity. It is only when one comes to specialised requirements such as cosmetic emulsifiers, cosmetic colorants, sophisticated moisturisers and lanolin derivates that the availability is restricted. It is heartening to learn that a number of small but progressive units are working towards import substitution in the manufacture of these specialised requirements. All the more so, as the raw materials in the cosmetic industry have specifications at times tighter than those for pharmaceutical raw materials, in respect of lead and arsenic content. It is hoped that in the not-too-distant future most of the cosmetic raw materials will be available from indigenous source.

In this era of consumerism, it is incumbent on any industry to ensure that the ultimate consumer be pro-

**PROFILE**

# Cosmetics and perfumery

WITH the increased urbanisation and the rise in working force in white collar professions, the demand for cosmetic goods is going up. There are a number of units producing cosmetics in large, medium and small sectors. According to the list of the Directorate-General of Technical Development, there are 16 units producing talcum powder, 11 producing face powder, and 13 producing face cream and snow. Five units produce tooth powder and eight, tooth paste. The production of cosmetic goods in the large, medium and small sector units is estimated at Rs 25 crores.

Exports of cosmetic goods are on the rise. In 1972-73, the exports are expected to go up by more than 20 per cent to about Rs 2 crores. Face powder export which was negligible up to 1969-70 is assuming importance. The exporters say that some of the chemical raw materials required for the production of quality goods are not available in the country. This is particularly so with industrial perfumery items. The packaging industry has also not developed sufficiently as compared with the development in the western countries and Japan, which is one of the constraints on the cosmetics exports.

The manufacturers say that they have improved plant efficiencies so that without the import of additional plant the output of machines has been steadily increased with resultant cost saving and the ability to meet increased demand. There has been improvement in the past few years in working conditions and wages. At the same time, by use of work study and incentive schemes, the industry has raised its overall productivity.

The manufacturers contend that the prices of the cosmetic goods have remained steady for the past few years. According to them it would not be easy to identify other products of daily and mass consumption the prices of which have remained steady during that period.

During the past two decades and a half, the perfumery industry has made good progress. With the diversification in the chemical industry, the imports of raw materials for perfumery have declined. Currently, the industry has to import about 30 per cent of its raw materials. If the growth in the production of aroma chemicals and essential oils is maintained the industry is confident that the imports currently of the order of Rs 3 crores would be reduced to a great extent. With varying climatic and soil conditions there is great scope for growing any essential oil plants. The Central Indian Medicinal Plants Organisation is doing considerable work in providing plants producing essential oils.

The present consumption of perfumery materials is about 2,000 tonnes per annum. With the increase in the consumption of soaps and detergents, the consumption of perfumery materials is expected to rise during the next few years. The perfumery manufacturers contend that production of processed foods, toiletries and cosmetics is dependent on good quality perfumery. There is also an export market for perfumery goods as also for the goods in which perfumery is used. It is therefore wrong to treat the industry as a luxury industry. Many of the units producing perfumery goods are in the small industry sector and the government should reorient its policy towards this industry so as to provide it with more credit facilities as also meeting its requirements of imports particularly the items in which canalisation has taken place.

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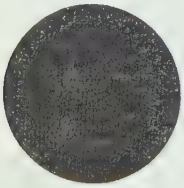
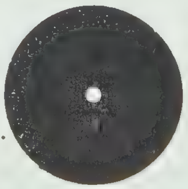


Take a glass dish and pour water in it. Sprinkle powdered charcoal or coloured powder on the water.



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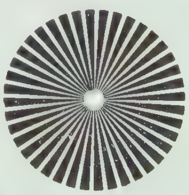

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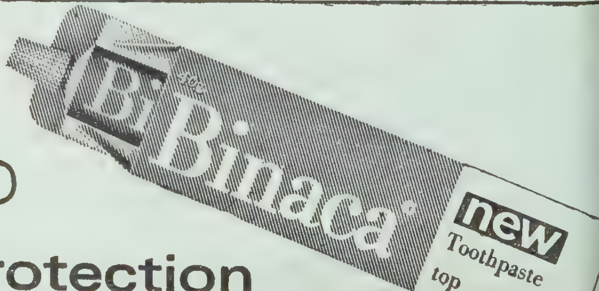

18 X Cosmetics

ed and assured of good wholesome merchandise. s is even more so in a sumer industry. In order guarantee the quality of ultimate cosmetic, it is sufficient only to comply h the provisions of the gs and Cosmetics Act in pect of raw materials and d manufacturing prac- es; the cosmetic has to be -tested by dermatological luation initially on ani- ls and subsequently on human subjects. This procedure, though expensive, is necessary to ensure that the cosmetic is not a primary irritant or a sensitiser and that it is not harmful to the user—either causing irritation on application or allergic type of reactions on continued usage. The product has to be free from pathogenic organism that could infect the user and the total bacterial count should be of a low order. With the entry of consumerism, the very thinking of the manufacturer has to be changed in order to ensure that the ultimate consumer is uppermost in his mind at every stage of operation.

It is only when this philosophy is accepted as a challenge, and a sincere and concerted effort is made, both by the organised and unorganised sectors that the ultimate user can be assured of quality cosmetics. A beginning has been made in this direction but the pace has to be accelerated by the industry with the help of the drugs control authorities, who could translate the latest technological findings into terms that are understandable to the small-scale industry and then enforce their implementation. Only then will the industry be able to stand on its own and Indian-made cosmetics will be acceptable in competitive markets the world over. □

# Perfumery: Towards self-reliance

**By G. D. Kelkar**

RFUMERY is an ancient industry in India. For turies perfumes, called ars", are being manufac- ed here using various vers such as rose (*gulab*), min (*mogra* and *chameli*) *kewra,* as well as many er natural perfumery raw erials. The traditional per- ery industry still exists Kannauj, a small town in ar Pradesh, is the centre he industry.

ne modern perfumery ustry does not depend en- y on natural raw mate- s. A number of compo- s of natural products are ufactured by cheaper hetic processes. Many nicals which have a ul odour-effect have been synthesised. These nicals, known as aroma nicals, which number 5,000, are used in perfumery industry. y natural raw mate- are also used in the of essential oils, resi- s, concretes and absolutes. e of the essential oils as citronella and lemon- s are used as basic mate- for the manufacture of na chemicals. The general d in the industry is to more and more of synthetic aroma chemicals, because they can be manufactured in the required quantity, are uniform in quality and are also less expensive than natural products.

Perfumery materials are used in the manufacture of soap, cosmetics and aggarbattis. As shown in the accompanying table the present consumption of perfumery materials in India is about 2,000 tonnes. Our *per capita* consumption of soaps and detergents is probably the lowest in the world. With the increase in the consumption of these items as well as other consumer products, the requirements of perfumery materials will considerably rise in the next few years.

Perfumery materials such as aroma chemicals, essential oils, resinoids, concretes and absolutes are generally used in the form of a blend. In the past, these blends were called perfumes, perfumery compounds or synthetic essential oils. Now they are called fragrances to avoid confusion with the word perfume which generally refers to consumer products such as alcoholic perfumes.

A perfumer's skill lies in blending various raw materials to create a fragrance which can be added to a finished product to enhance its consumer appeal. In the past, manufacturers of major consumer products had creative perfumers in their organisations. The latest trend even in advanced countries of Europe and in the US is to buy readymade fragrances from perfumery houses. This trend has started mainly because of the fast development in the industry by way of synthesis of new aroma chemicals. Generally the newly developed raw materials are sold by the manufacturers as fragrances until they become well-known in the industry. The fragrances of some of the successful toilet soaps in Europe are created by perfumery houses.

There are hardly 50 such trend-setting perfumery houses in the world. Formulas of fragrances are highly guarded trade secrets of these houses. Even in the big perfumery houses there are very few in the organisations who have access to the complete formula of a fragrance. Probably this is the reason why the business is in the hands of such a small number of units.

During the past 25 years, the Indian perfumery industry has made considerable progress. Except a few raw materials such as sandalwood oil, palma rosa oil, lemongrass oil and linaloe berry oil everything else had to be imported in the past. Today we can proudly boast that 70 per cent of the ingredients are indigenous. Among the aroma chemicals consumed in large quantity benzyl acetate, terpineol, phenyl ethyl alcohol, derivatives of citronella and lemongrass oils, nitromusks are manufactured in our country. Two essential oils, namely mentha arvensis oil

**Requirements of perfumery materials**

| Product | Production per year (tonnes) | Fragrances requirement. Qty. (tonnes) | Value Rs (lakhs) |
|---|---|---|---|
| Toilet soap .. .. .. .. | 45,000 | 450 | 337 |
| Washing soap (organised sector) .. | 1,50,000 | 300 | 75 |
| Washing soap (small-scale) .. .. | 3,50,000 | 350 | 35 |
| Detergents .. .. .. .. | 50,000 | 100 | 40 |
| Tooth powder .. .. .. .. | 488 | 5 | 6 |
| Tooth paste .. .. .. .. | 4,864 | 50 | 62 |
| Talcum and face powder .. .. | 3,000 | 30 | 60 |
| Face cream and snow .. .. .. | 753 | 5 | 15 |
| Hair oils .. .. .. .. | 5,000 | 50 | 50 |
| Agarbattis .. .. .. .. | 5,000 | 200 | 120 |
| Disinfectants and insecticides .. | .. | 150 | 30 |
| Tobacco, snuff and betelnut .. .. | .. | 20 | 30 |
| Flavour ingredients .. .. .. | .. | 160 | 128 |
| Direct use .. .. .. .. | .. | 20 | 60 |
| Other uses .. .. .. .. | .. | 110 | 66 |
| | | 2,000 | 11,14 |

(Cresylic acid and menthol have not been included in the above estimate.)

---

r Kelkar is director of I. Kelkar & Co Private Bombay.

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citronella oil are now pro- ed and if the present rate growth is maintained we soon reach a stage when can stop imports.

dia is fortunate to have variations in climatic ditions, soil and altitude that we can easily find uitable area to grow any ntial oil-bearing plant. In e of this, progress in the duction of essential oils not been satisfactory. If ous efforts were made it ıld not be difficult to meet demand of essential oils as geranium, lavender, endin, patchouly, pepper- t spearmint and ylang g oils from indigen- production. The Cen- Indian Medicina'l ts Organisation has done iderable work in this and it is only because of nisation's efforts that the t type of planting mate- is available in the coun- for all these essential

here is no proper under- ding of the problems of industry by the Directo- -General of Technical elopment, government India, as DGTD con- s perfumery as a ry industry. One ex- le of how the industry suffered because of the rnment policy is citro- oil.

ring the year 1964-65 was surplus production emongrass oil. At the time, exports of the oil canalised through the Trading Corporation. t 1,400 tonnes of oil was mulated and the price ped to Rs 12.50 per kg. At price it was worth con- ng it to derivatives nor- y made from citronella Two major manufac- rs made efforts to use sur- lemongrass oil. Know- his new outlet for lemon- oil, the import of citro- oil was banned. Later on price of lemongrass went nd reached Rs 65 per kg hich price it was uneco- cal to use lemongrass oil hese new processes and was a shortage of citro- derivatives. At this import of citronella oil have been allowed. But mport of citronella derivatives was allowed against export replenishment licences. The installed capacity for citronella derivatives was kept idle.

The imports of citronella oil have been canalised through the State Trading Corporation. Even now DGTD does not allow the imports of required quantity of citronella oil to manufacturers. The indigenous production of citronella oil is hardly 10 per cent of the total requirements.

Although the total production of perfumery is small, a production of about Rs 200 crores to Rs 250 crores is dependant on the perfumery industry. Who will use a toothpaste or a biscuit without a flavour, or a toilet soap without a perfume?

It is estimated that essential oils and aroma chemicals worth Rs 3 crores are imported per year. At the same time sandalwood oil, lemongrass oil, palma rosa oil and non-alcoholic perfumery compounds worth Rs 5 crores are exported per year. Therefore, the perfumery industry is not a burden on scarce foreign exchange resources of the country.

Recently a report was submitted to the government by Mr E. A. Corcoran, a UNIDO (United Nations Industrial Development Organisation) expert. This survey was made with a view to increasing the exports of essential oils, perfumery toiletries and cosmetics. Mr Corcoran who has made a number of recommendations made it clear that the perfumery industry is not a luxury industry. He has also said that the development of this industry requires a lot of research and development work which could not be undertaken by small-scale units for which the formulated perfumery compounds have been reserved. He has recommended adequate incentives even though the formulations of fragrances are not disclosed by manufacturers. If these recommendations are implemented we can definitely get a major share of business especially in South-East Asian, West Asian and African markets. ☐

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Crest does not wash away or brush off.
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# Major manufacturers

## Cosmetics and toiletries

A.V.R.A. & Co., 263, Thambuchetty St., Madras-1.

Alembic Chemical Works Co. Ltd., Baroda-3.

Allied Chemicals Pvt. Ltd., 79, Dr. A. Besant Rd., Bombay-18.

Anglo Indian Drug and Chemical Co., 285, Jama Masjid St., Bombay-2.

Ayurved Sevashram Ltd., Udaipur.

Bathgate & Co. Ltd., 18-19, Old Court House, Mahim, Bombay-16.

Beecham (India) Pvt. Ltd., Beecham House, Mahim, Bombay-16.

Belleza Beauty Parlour, Hampton Rd., Wodehouse Road, Bombay-1.

Bengal Chem. & Pharm. Works Ltd., 198, Mancktollo Main Road, Calcutta-1.

Bombay Soap Factory, Two Tanks, Bombay-8.

Burroughs Welcome & Co. (India) Pvt. Ltd., 16, Bank St., Bombay-1.

Bhagwati Cosmetic Laboratories, Kampoo, Gwalior.

British Drug Houses (India) Ltd., Dr. A. Besant Rd., Bombay-18.

C. K. Sen & Co. Pvt. Ltd., 34, Chittaranjan Avenue, Calcutta.

Calcutta Chemical Co., 35, Panditia Road, Calcutta-29.

Cheseborough Ponds Inc., 13, Gunbow St., Bombay-1.

Ciba of India Ltd., 14, J. Tata Road, Bombay-1.

Colgate Palmolive (India) Pvt. Ltd., Steelcrete House, D. Vachha Road, Bombay-20.

Crooks Interfran Ltd., 254, Worli, Bombay-18.

Dabur (Dr. S. K. Burman) Ltd., 142, Rash Behari Avenue, Calcutta.

Dentifrice and Cosmetics Research Laboratories, G-60, Nizamuddin West, New Delhi-13.

E. S. Patanwalla, Victoria Road, Bombay-27.

Everest Chemical and Cosmetic Works, 8-506, Prakasamnagar, Secunderabad.

Emoc Cosmetics (India), 24, B. Shankar Road, Bombay-28.

Franco Indian Pharmaceuticals Pvt. Ltd., 20, Dr. E. Moses Road, Bombay-1.

Geoffrey Manners & Co. Pvt. Ltd., Magnet House, Dougall Road, Bombay-20.

Godrej Soaps Pvt. Ltd., Delisle Rd., Bombay-13.

Government Soap Factory, Rajajinagar, Bangalore.

Ganga Works, Lattice Bridge Road, Adyar, Madras.

Himani Pvt. Ltd., B.T. Road, Belghurriah, Calcutta-56.

Hindustan Lever Ltd., Lever House, Backbay Reclamation, Bombay-20.

Hygienic Research Institute, 136, Apollo Street, Bombay-1.

Imperial Chemical Industries (India) Pvt. Ltd., 18, Strand Road, Calcutta.

J. K. Group of Industries, Kamla Tower, Kanpur.

J. K. Helen Curtis Ltd. J. K. Bldg., Dougall Road, Bombay-1.

John Parson & Co. (India) Ltd. 163-A. Foreshore Road, Howrah.

Johnson and Johnson of India Ltd., Agra Road, Mulund, Bombay-80.

Kalapi Stores, 35, Swadeshi Market, Bombay-2.

Kosmek Pvt. Ltd., Cecil Court, Lansdowne Road, Bombay-1.

Lakme Ltd. 24, Bruce St., Bombay-1.

Lure Sales Corporation, Lalwani Ind. Estate, Katrak Rd., Bombay-31.

Manyam & Co., Raja Snow Bldg. Seshadripuram, Bangalore-20.

Martin and Harris Ltd., Mercantile Bldg., Lal Bazar St., Calcutta.

Midrose Cosmetic Industries, Parmanandwadi, Thakurdwar Road, Bombay-2.

Metro Cosmetics and Pharmaceuticals, 1-5-67, Musheerabad, Hyderabad-20.

Modi Industries Ltd., Modinagar, U.P.

Mysore Chemical and Soap Works, Sion, Bombay-22.

National Trading Co., Mangaldas Bldg., Mangaldas Road, Bombay-2.

Nogi & Co., Pvt. Ltd., 177, Girgaum Rd., Bombay-2.

Orient Cosmetics Pvt. Ltd., A-1, Super Industrial Estate, Madras-32.

Rambir & Co., 24-A, Khatarali Lane, Bombay-4.

Reckitt & Colman of India Ltd., 41, Chowringhee Road, Calcutta.

Sahib Singh Manufacturing Co. Pvt. Ltd., 7, Okhla Industrial Estate, New Delhi-20.

Smith Kline and French (India) Ltd., 25, Ropewalk Lane, Bombay-1.

Smith and Nephew (India) Ltd., Poisar Bridge, Bombay-67.

Smith Stanistreet & Co. Ltd., 13, Convent St., Calcutta.

Slovak Cosmetics, 384, Cadell Road, Bombay-28.

Step Cosmetics Laboratory, Meghdoot, Flank Road, Bombay-22.

Super Toilet and Chemical Co. Pvt. Ltd., 80, Cornawalis St., Calcutta-6.

Swastik Oil Mills Ltd., Wadala, Bombay-31.

Tata Oil Mills Ltd., 24, Bruce St., Bombay-1.

Universal Perfumery Wor
126, Chinch Bunder Roa
Bombay-9.

Vegetable Soap Works, Kozh
kode (Kerala).

Vijaya Chemical and Toil
Works, 35, Clements R
Madras-7.

## Perfumery

Asha Agencies Pvt. Lt
Tulsipipe Road, Bo
bay-16.

Bhavnagar Oil and Chemi
Industries Ltd., M. G. Ro
Bhavnagar.

Chemafumes Pvt. Ltd.,
Horniman Circle, Bo
bay-1.

Gujarat Perfumery Work
Outside Premgate, Ahmed
bad.

Industrial Perfumes Ltd.,
Bruce Street, Bombay-1.

Jayalakshmi Perfume
Works, 592 Sajjan Roa
Bangalore-4.

Mahendra Perfumery Work
5, S. V. Lane, Bangalore-2

Manohara Perfumery Work
24, Saurashtrapet Bang
lore-2.

Mysore Jyothi Perfume
Works, 1391, Temple Roa
Bangalore-2.

Mysore Sultan Perfume
Works, 3, Chamaraipe
Bangalore-18.

Rajahans Perfumery Work
Gita Mandir Road, A
medabad.

Rohit Industries, Kaly
Nagar, Ahmedabad-8.

S. H. Kelkar & Co. Pv
Ltd., Mangaldas Roa
Bombay-2.

Swatantra Perfumery Work
7, Ramkrishnapuram, Ba
galore-7.

Sova Perfumery Work
1-B.C. Haripal Lane, Ca
cutta.

Vanco Perfumes (India
1254, Bhavanipet
Poona-2.

Vijayam & Co. (Madras) Pv
Ltd., 53 Thambuchetty S
Madras-1.

Vora Chemical and Pharm
ceutical Works, Sarangp
Chakla, Ahmedabad.

# Machine tools industry

**—A FEATURE**

## Stagnation in exports

**y N. P. Godrej**

'HE Indian Machine Tools Manufacturers' Asso- ation celebrated its Silver bilee in March 1972 in the stinguished presence of the esident of India, Mr. V. Giri. A significant event the year was the Second l India Machine Tool Exhi- ion organised by the Asso- tion at Bombay in February 72. The exhibition received mendous response from the gineering public and user ustries. The exhibition gave aluable opportunity for the nufacturers to have techni- dialogue with their cus- ners and book orders. The sociation also organised a chine tool pavilion in the rd Asian International de Fair held at Delhi under auspices of the Engineering port Promotion Council. machine tool stalls were ted by a large number of ple. However, little export iness could be secured by participating members at Fair.

uring the year the Asso- ion and its members have ely identified themselves the formulation of a nce and Technology Plan machine tools by parti- ting in the deliberations of various working groups set nder the National Com- ee on Science and Techno- . The Association is once n sponsoring India's parti- tion in the International nine tool exhibition to be at Hanover in September , for display of over 60 nine tools. The Association has now on its rolls 135 members including major manufacturers from the public, private and small scale sectors.

### Growth of the industry

Production in machine tool industry during the years 1971 and 1972 showed an increasing trend. The following table shows how the tempo of production has been maintained during the last four years particularly after recovering from the recession of 1966-68 :

| | Total consumption of machine tools (Rs in crores) | Indigenous production (Rs in crores) | Percentage of production to consumption |
|---|---|---|---|
| 1968 | 52.26 | 20.63 | 39 |
| 1969 | 42.71 | 26.67 | 62 |
| 1970 | 52.96 | 37.45 | 70 |
| 1971 | 68.95 | 50.30 | 73 |

Production has not only increased in value but the range of machine tools now being produced has widened considerably. During the past few years the industry has taken major steps in diversification by developing new types of machine tools and accessories. In addition to the general purpose machine tools like centre lathes, turrets and capstans, drilling and milling machines, grinders, shapers, planers, presses, etc., new designs of machines like internal grinders, centreless grinders, automatic threading machines, die-casting machines, plastic blow moulding machines, bed type milling machines, gear hobbers, gear shapers, heavy duty planing machines, all electrical milling machines, high production copying lathe, multi-tool automatic lathe, multi-spindle automatics, horizontal boring machines, chuckers, heavy capacity presses, etc have been developed. Besides, some special purpose machine tools and transferline machines are being manufactured. Efforts are also being made to develop numerical control for machine tools at the Central Machine Tool Institute.

### Utilisation of installed capacity

The present installed capacity of the industry is estimated at Rs 80 crores. Even if the industry maintains its present level of production of Rs 55 crores, there would still be an unutilised capacity of Rs 25 crores. This brings us to the question of identifying gaps in the present production programme. There is a need for analysing the future requirement of the user industries so that the machine tool manufacturers plan their manufacturing programme in the right direction. An effort is being made by the Development Council for Machine Tools to identify these gaps and it is noteworthy that a committee has been already appointed to go into this question. I would like to go a step further and suggest that the Development Council should sponsor a detailed survey of machine tool requirement categorywise, typewise and sizewise in order to help the existing manufacturers as well as new entrants to orient their production to actual demand. Such a survey should, of course, cover, besides new machines for expansion, also machines to replace old and obsolete equipment. In this context I welcome the recommendation of the Development Council to up-date the census data on machine tools. A periodical up-dating of census data would be very useful to the machine tool manufacturers in knowing, from time to time, the pattern of installation of machinery by user industries.

### The industry in the Fifth Plan

The Working Group for machine tools appointed by the Task Force of the Planning Commission has prepared estimates for the demand and production of machine tools during the Fifth Five-Year Plan. Assuming a growth rate of $7\frac{1}{2}$ per cent per annum, they have estimated production of major machine-tool-using industries at the end of the Fifth Five-Year Plan at Rs 2,441 crores. On this basis the Working Group has estimated a demand of 30,000 metal working and metal forming machine tools (Group A) of the total value of Rs 105 crores by the end of 1978-79. This demand is to be met by indigenous production of 25,500 machine tools of the value of Rs 78 crores and imports of about 4,500 machine tools of the value of Rs 27 crores. The annual requirement of Group B, i.e. other metal working machinery, would be approximately Rs 26 crores, out of which Rs 6 crores worth of machines will be imported. The total installed capacity of Group A and Group B machine tools at the end of the Fifth Five-Year Plan is estimated at Rs 130 crores. I understand, the Planning Commission considers this inadequate as it anticipates a higher rate of growth than $7\frac{1}{2}$ per cent for the user industries.

In this connection I would like to recall that Plan targets of machine tools were set very high in the past and accordingly large capacity was created in the industry. This was one of the reasons why as much as 60 per cent of the capacity remained idle during the recession of 1966-68.

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*xt of the speech delivered Ir Godrej, president of the in Machine Tools Manu- rers' Association, on h 6, at the 26th Annual ral Meeting of the Asso- n held in Bombay.*

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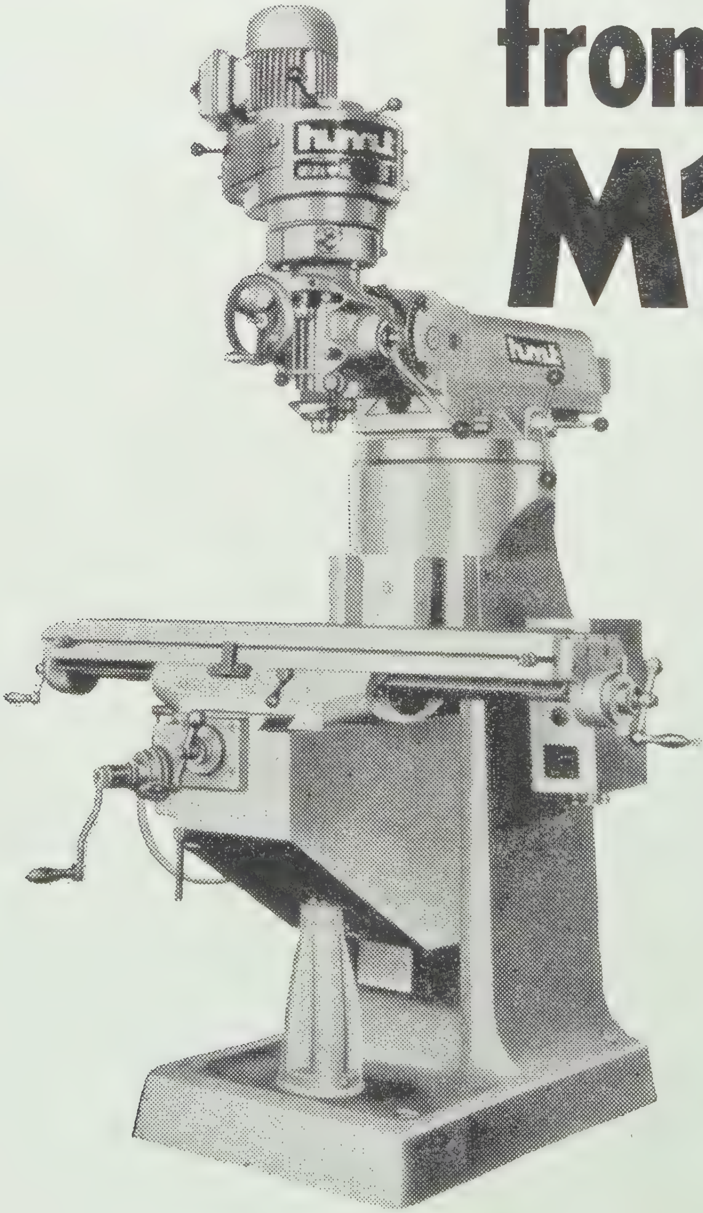

**HINDUSTAN MACHINE TOOLS**
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before the Planning Com-
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## nsing policy

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recent meetings of the
lopment Council, it has
told on behalf of the
rnment that development
w machine tools would be encouraged. If the manufacturers come forward with proposals for building new machine tools without foreign collaboration and with import content not exceeding 10 per cent of the value, industrial licences would be granted without objections. Although this is agreed in principle, it would be desirable that the Government issue an official notification to clear doubts in the minds of machine tool manufacturers intending to benefit from this policy.

## Holding company for machine tools

I would now refer to the various reports about the proposed Holding Company in machine tools. All public sector units will be brought under the control and supervision of the Holding Company. The Holding Company is to control and co-ordinate the operations and the working of different machine tool units in the public sector and thereby help to increase their range, productivity and profitability. It would streamline and rationalise the manufacturing activities of these units.

However, there are at present some confusing reports regarding the scope and functions of the proposed Holding Company. It is said that the Holding Company would take over the imports of machine tools. This is essentially a problem which concerns the users of machine tools. Presently all imports in machine tools are screened in great detail and licences are issued only to Actual Users.

In view of the strict control on imports and the effective scrutiny enforced now, I do not know what benefits are likely to accrue by canalising the imports through the Holding Company. On the contrary it would only help to add one more agency in the existing arrangements leading to delays and make imports more costly. Further, it is reported that in due course of time, the Holding Company may take over manufacturing units in the private sector also. For a highly technology-oriented and sophisticated industry like machine tools such centralisation under one Holding

**PROFILE**

# Machine tools industry

THE machine tools industry has grown considerably during the two decades of planning. The industry being capital-intensive with a long gestation period, the manufacture of machine tools was started in the public sector. Besides the Hindustan Machine Tools there are also other units like the Heavy Machine Tools Plant at Ranchi, Machine Tools Corporation at Ajmer and Praga Tools Ltd., Secunderabad. There are currently 76 medium and large units on the list of the Directorate General of Technical Development. Also there are about 1,000 small units manufacturing machine tools. The installed capacity of the machine tool industry at present is for a production worth Rs. 70 crores per year.

The range of products covered by the indigenous industry has increased substantially. The indigenous industry is now in a position to supply very high capacity presses and sheet metal working machinery of almost any kind, size and capacity. It is also in a position to manufacture machines such as thread rolling machines, internal grinders, centreless grinders, crankshaft grinders, tapping machines and hydraulic equipment.

To encourage and meet the design needs of the industry, the Government has set up several centres which design and develop prototypes of machine tools. These are ultimately taken up for manufacture by various units in the small sector. The National Committee on Science and Technology has set up a separate panel for formulating and implementing a national technology plan for machine tools.

India as a comparatively newcomer in the field of machine tools has to face an uphill task in the highly competitive international market for machine tools but there are favourable factors such as availability of raw material and low-cost labour which should make India one of the leading exporters of machine tools. The machine tools exports have reached a level of Rs 3.5 crores per year.

The machine tool industry is in an intense phase of diversification and will be going for the manufacture of more sophisticated and special purpose machines. With the rapid development of the electronic industry, the machine tool industry will adopt more and more electronic controls on machine tools. A beginning in this direction has already been made. Digital readouts have been developed by the Central Machine Tool Institute, Bangalore and these can be fitted to any machine. Provision of numerical control system in machine tools will certainly help in getting consistent repeatable accuracy, higher machine utilisation and saving of jigs and fixtures.

The development of the machine tool industry, which employs nearly 25,000 people, has created a well trained technical force in all categories. The industry is backed by a large number of designers, production engineers and other personnel at managerial level. With this background, it is possible for India to offer assistance to other countries for setting up their machine tool industry.

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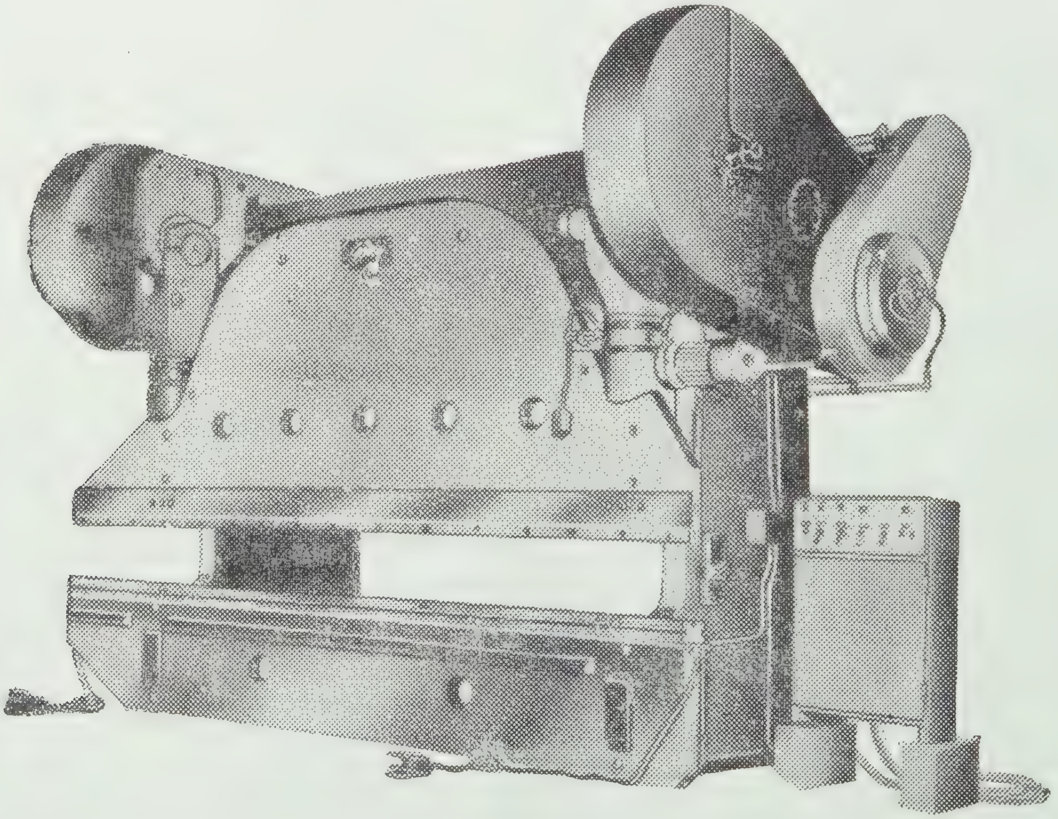

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pany would be most nful. It would be against proclaimed policies of the ernment. It would block pportunity and initiative new entrepreneurs who d otherwise enter this which is so desirable, for taining the efficiency of user industries. The Gov- nent should, therefore, ly define the scope and tions of the proposed ing Company to allay any ivings in this regard.

### rt trends

ere has been a sharp ne in the imports of nine tools. The imports tituted 30 per cent of consumption in the year as against 64 per cent in 30 per cent imports of ine tools may still appear igh a figure to many of But let us for a moment der the figures for ine tool imports of devel- countries which are dered to have reached hy, even enviable, self- iency as regards machine They are quite thought- oking. West Germany im- 25 per cent of its re- ment of machine tools, 35 per cent, the UK er cent, France 50 per and Netherlands 80 per Evidently these coun- still find it economically able to import quite a percentage of machines abroad instead of making indigenously. India could y afford to overlook this proven logic. In plain s, complete self-reliance achine tools is neither ole nor desirable.

r striking a balance of num advantage to the try, Indian machine manufacturers should the freedom not only to rt foreign technology gh collaboration but oreign machine tools and equipment not yet able in the country.

### rts

ogress achieved earlier in evelopment of export of ine tools could not be tained during the last years. Exports of ine tools increased by four times from Rs 66 in 1966-67 to Rs 295 lakhs in 1969-70. However, during the next three years there has been almost a stagnation and the export of machine tools has not crossed the Rs 3 crores mark. Exports were Rs 280 lakhs in the year 1970-71 and Rs 298 lakhs in 1971-72. During the current financial year these are likely to be still lower as exports in the first 8 months of 1972-73 were only Rs 140 lakhs. With this declining trend it would not be possible to reach the target of Rs 7.5 crores laid down for 1973-74.

Exports to the West European countries, the US and Canada were substantially lower in the past two years. However, Australia, New Zealand and South East Asian countries like Malaysia and Philippines have emerged as main importers of Indian machine tools. Australia and New Zealand in particular depend largely on imports for their requirement of machine tools. With Britain joining the European Common Market, these countries would be interested in importing their requirements from a geographically closer country like India if we could offer the right types of machines at competitive prices.

Experience has shown that we are at a great disadvantage when trying to earn foreign exchange at any cost by selling machine tools. The prospective buyer countries, among whom the East European ones predominate, do not accept machines of any design not based on a collaboration, preferably with West European countries. And, then, the prices have to be a fraction of the international prices for such machines. It is a moot point how our country is helped at all in the final analysis, if we have to sell good quality machines at losing prices; that is not our only loss. By this policy we make the buyer countries all the more competitive against us in the world market. And when they in turn sell their machines to us we have to pay almost international prices. There is no doubt that we must earn foreign exchange but in my opinion items for export must be chosen very discriminately so that we are enabled to get, at least in later years, a fair price.

### Measures to revive exports

In the past the Association had drawn a package plan for developing export and implemented some useful schemes of participation in the Hanover exhibition like inviting dealers teams to India. This helped to expand the export trade in machine tools. The present set-back in exports has been discussed in depth by us in the Association and based on these deliberations I would like to make some concrete suggestions for reviving and accelerating the growth in exports.

(i) Although there is a scope for the export of general purpose and standard machine tools, some of the machine tools made in India in these categories have become outdated in designs. These machines are therefore not suitable for export to industrially advanced countries. The industry will have to undertake design changes to keep in line with the demand trends and the technology abroad. A detailed survey and study of individual export markets should be undertaken to guide the Indian manufacturers in this regard.

(ii) Developing countries still need in large quantities simple, standard, low priced machine tools with accessories and attachments suitable for small workshops and training centres. It would be advisable for our manufacturers to meet these requirements by developing low-priced machine tools specially

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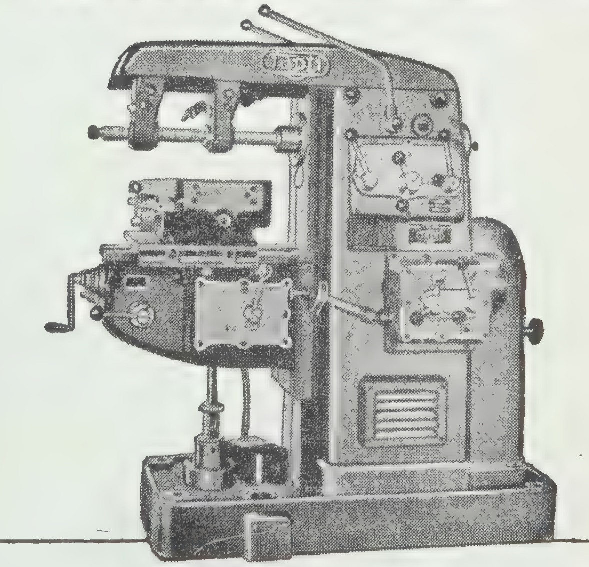

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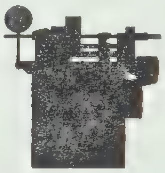

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OBM/8428 R.

uch markets. Manufac- s interested in making machines should be given elp and facilities.

) In case of some ma- s made in this country est has been evinced by rters in the advanced tries. However, due to imited licensed capacity not possible for the n manufacturer to meet ge order coming from d. In some cases such t orders have been lost e products in required tities could not be manu- red in the required time. overnment should there- consider whether new ries for exports only d be established. In this ection Government may interest reputed foreign facturers to set up new in collaboration with n partners for making ine tools mainly for eas markets.

Our experience at the Hanover exhibition of clearly brought out ct that participation in alised machine tool fairs e direct and quickest d to improve exports. ese fairs the manufactu- mes into direct contact customers and distribu- and gets a first-hand edge of their require- . The Association has to sponsor Indian par- tion in the Hanover Ex- on of 1973, International ne Tool exhibition icago and other interna- shows. Such participa- vould not only improve export prospects but help us in improving uality of our products. absolutely necessary for esigners, production en- s and commercial execu- o visit such international ne tool fairs and get elves acquainted with test trend in technology emand.

ortunately our proposals ending teams to the ean Machine Tool Ex- on of 1971 and the go Machine Tool Show 2 were not approved by nment. The Associa- proposal for the MDF for participation in IHA 73 Hanover is now pending with the Ministry of Commerce and we hope the Government would support it in a big way, at least on the lines done for IHA 70.

(v) Established importers and distributors from abroad should be invited to visit India so that they can go round various manufacturing plants and see for themselves the production facilities, methods of quality control and quality of finished products manufactured in India. Such visits will be useful in promoting the export of machine tools and we expect the Government to render financial assistance available under the MDF scheme.

(vi) For an item like machine tools, pre-sale and after-sale service is an important pre-requisite. This is particularly more applicable to the export business. Real sale of a machine tool begins after it is delivered. Setting up a sales and service organisation abroad for machine tools is a costly arrangement and it is not possible for individual manufacturers to bear the cost. However, a group of manufacturers or exporters can come together and form a consortium for developing export of their products. If the Indian machine tool manufacturers have to remain in the export trade, it should be absolutely necessary for them to come together and work as a consortium. The members to seriously consider this proposal and the Government should help this consortium, when formed, in every possible way.

(vii) Recently in some of the trade agreements concluded with the East European countries, machine tools have been included as one of the items. But very little export business actually materialises with these countries as the prices offered are not adequate. Government should persuade these countries to buy Indian machine tools at fair prices.

## Export obligations under collaboration

While considering the applications for approval of a collaboration agreement for building machine tools onerous conditions of export are imposed by the Government. Since, normally, the collaborators already have licensing agreements in various countries banning sale of their machine tools built elsewhere, they are unwilling to take any responsibility of selling machine tools built in India in the world market. When such an obligation is imposed on the manufacturer, which he finds it difficult to fulfil, he has to reluctantly give up the idea of building sophisticated machine tools in the country.

In the absence of domestic production there is neither any earning of foreign exchange nor saving of outgoing foreign exchange. Therefore in the case of machine tool industry which has a long way to go, since we do not build sophisticated machines, rigid export obligations act as a deterrent on their development and expansion and therefore merit relaxation, depending on the nature of the product.

The machine tool industry in India has been developed mainly as an import substitution. Hence whatever demand is met by the indigenous production saves the foreign exchange which otherwise would be spent on import. Any foreign exchange saved is as good as foreign exchange earned. If this proposition is accepted, then Government should be satisfied if foreign exchange is saved by import substitution and should not insist on guaranteed exports for machine tools.

## Science & Technology plan

The machine tool industry in this country has developed mainly with the assistance of foreign collaborations arranged in the initial period of its growth. The industry depended largely on the designs and technical know-how obtained through foreign collaborations. No adequate attention was given to evolving designing facilities or improving technology indigenously.

With the Government policy of discouraging foreign collaborations, stress is now being rightly laid on evolving our own designs and improvement in technology. When Research and Development in machine tool design and production technology are still in infant stages, it is gratifying to note that the National Committee on Science and Technology has been formed for making machine tool industry more self-reliant. This is a good beginning. The NCST has set up a special panel for machine tools under which 13 different groups have been assigned the work of preparing detailed plans of technological development in machine tools. These groups are in the process of formulating their report and based on them the final plan for the machine tool industry will be evolved. The main object of the National Technology Plan for machine tools is to develop those types of machine tools which are at present imported and thus achieve a greater degree of self-reliance.

The NCST Plan also envisages to develop technical competence in machine tools and close the gaps with the advanced countries in certain selected areas within the next 5 to 10 years. This plan should not, however, preclude those who desire foreign collaboration as the effect of this body will take some time to materialise.

The Government and the NCST must be complimented for realising the vital importance of research and development in machine tools. We are happy to see the Government thinking in terms of paying full expenses for development of a new design, 50 per cent of which expenses are later to be reimbursed to the Government if and when the machine built to the new design is put on the market. The NCST programme offers a challenging opportunity to the machine tool designers and technical experts. I am sure members of the Association would come up with definite research and development programmes and take the fullest advantage of the NCST scheme.

I am glad to note that the CMTI has been given a pivotal role in the NCST Plan for machine tools. A proposal to set up a National Documentation and Information Centre at CMTI under the NCST programme is also under consideration.

With the implementation of the NCST programme, the CMTI would be in a position to render more useful assistance in improving the existing designs of machines and develop modern machine tools specially with numerical controls. Numerical control could be a major growth area in the future for exports.

Metal forming machines will also be required in large numbers by the user industries in future. It is, therefore, gratifying that the Government intends to start a separate division for research and development in this field.

### Role of small-scale sector

The small-scale sector makes a significant contribution to the machine tool business in India. We have a number of members in the Association from this group. In the Machine Tool Exhibition held at Bombay last year, many machine tools made by small manufacturers were displayed side by side with machines made by other manufacturers. Considerable interest was shown by the visitors in these machines. Majority of the units in this group being in the unorganised sector, it is not possible to get an exact figure of their production.

However, it is estimated that the production of machine tools and allied products in the small-scale sector is of the value of approximately Rs 4.5 crores. Value-wise this may not seem large but in the context of the limited range of machine tools manufactured by these units, the quantity-wise production is not insignificant. There is a class of machine tool users which cannot afford to buy from the organised machine tool sector as they require simple and low price machine tools.

The small-scale sector mainly caters to this class of users which is quite large in number. The small units are spread out in the Ludhiana-Batala-Jullundur region of Punjab, Haryana, Howrah, Coimbatore and Ahmedabad. The machines in these small units are made mainly by technicians who lack design facilities. It is, therefore, necessary to help these small-scale producers to improve their machines by adoption of superior designs so that they can supply quality machine tools at reasonably low prices. I feel that Government can and should help them in this matter. The Government can, for instance, assign trainee engineers to these small units, taking upon itself the paying of stipends to the engineers. Perhaps CMTI can help them by offering improved yet simple designs. If the small manufacturers of machine tools are persuaded to take the benefit of some of the services rendered by the CMTI, it would be possible for the users in the small-scale sector to get better machines at moderate prices.

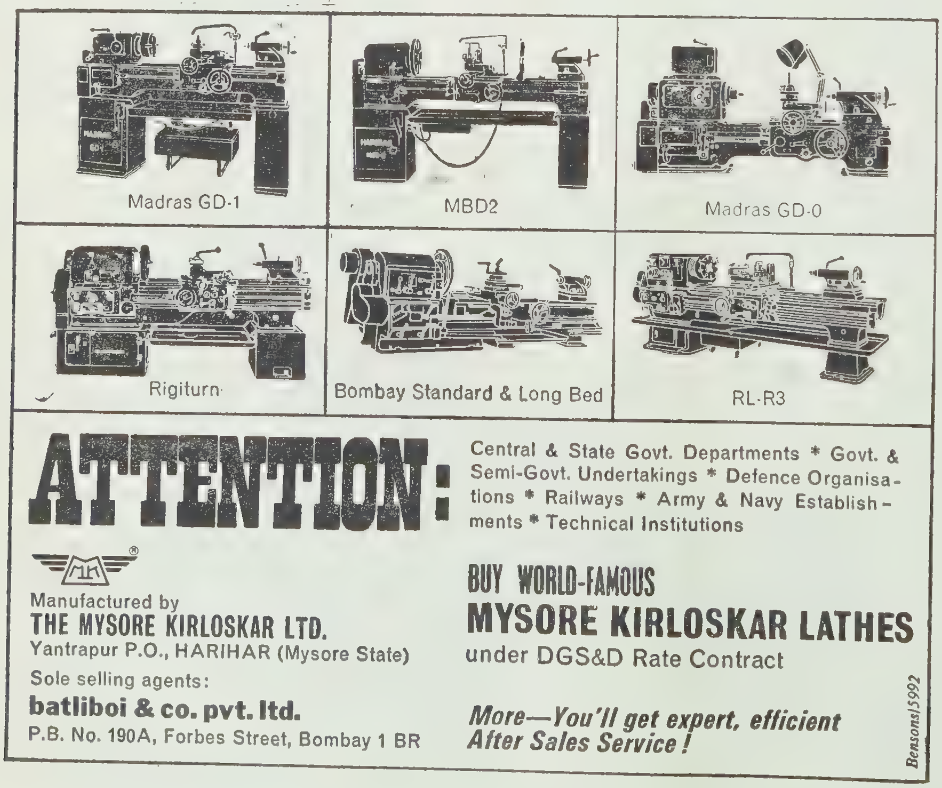
### Outlook for future

In spite of the progress achieved in the production of machine tools during the last four years, the outlook for the machine tool industry in coming years is far bright. The machine too dustry is facing shortage raw materials like sp steels, pig iron, castings, scrap of different kinds, c fuel oils, etc. Canalisatio imports of steel is not further adding to delay what is even worse, it is cult to get materials of right specifications. Cons able delay is also being e rienced in obtaining Ac User Licences for impor raw materials and cor nents. Similarly delays in cessing applications for import of machinery for placement by Actual U need to be minimised. Un delay in granting t licences is likely to enh replacement cost as wel affect the productivity du obsolescence of the insta machinery.

But all these causes into insignificance if the he of the user industries is thr ened. To whom could machines be sold if the industries themselves struggling for their survi Sad to say, that is almost prospect facing us today. most vital and immediate blem for all industries is power-cut effected in aln all the states of the coun This power-cut varies from per cent to 75 per cent. It affected adversely the in trial and agricultural pro tion. Some industrial u have closed down; and n are facing closure. It is mated that the total loss industrial production on count of the power-cut du the year 1972-73 would about Rs 1,000 crores. Mach tool industry would be first to suffer a set-back un such conditions.

Aware as our planners m have been of the vagaries the monsoon, it is hard believe that so severe a po shortage could become sible without some flaw other in their planning.

We hope that things take a turn for the better that this industry which been nurtured so caref may not unduly suffer.



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# Indian Engineering Association (Southern Region)

**—A FEATURE**

## Challenges before the engineering industry

**S. Santhanam**

RADICATION of poverty
and enlightened self-reli-
ce are the two major objec-
es of India's Fifth Five-
ar Plan (1974-75/1978-79).
e Plan aims at zero net
eign aid by 1978-79. Some
the physical targets envis-
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mediate concern to us are:
n ore 66.5 million tonnes;
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he recent NCAER review
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dy points out that the
eign exchange position is
sfactory and would enable import of raw materials and even capital goods when urgently required. The NCAER, however, underlines the necessity for further investment to achieve a 10 per cent growth rate and stresses the need for improved performance of public sector enterprises. The IEA is in full agreement with these views and it is hoped that the Central and State governments will so formulate their industrial and fiscal policies as to make possible such massive investments. While it is gratifying to see that there is improvement in the operating performance of some of the public sector enterprises, there is certainly an urgent need for a significant improvement in respect of several others.

It is expected that the growth rate of industrial production in 1972 will rise to about 7 per cent. This is certainly encouraging when compared to the much lower performance of the previous two years. In spite of this improvement, utilisation of capacities was 50 per cent or even less in a number of sectors of the engineering industry such as machine tools, diesel engines, mining equipment, steel pipes and tubes. This was partly due to lack of demand but in many cases to the non-availability of steel. The shortage of coal and power added significantly to the problems of the industry. The country is also deficit in respect of various non-ferrous metals—for instance, over 80 per cent of the total availability of copper is met by imports.

Our anxiety today is to ensure the fullest possible utilisation of capacities of our existing industries and to overcome the many constraints we face in key areas such as power and raw materials.

In keeping with the official policy of indigenisation of plant and equipment for expansion of the steel industry, the Association participated in meetings convened by the Secretary, Ministry of Steel, and the Heavy Engineering Corporation in order to consider ways and means of developing self-reliance in this field. The members of the Association were requested to register with HEC for supply of various types of equipment. The HEC has planned to hold an exhibition of drawings for this purpose in Madras in the near future.

### Constraints on capacity

There is no doubt that there is considerable confusion in the minds of industry and the authorities on exactly what constitutes "capacity". Therefore, the expression "capacity" requires a better understanding between the Government and Industry. Certain industries have been able to exceed their licensed capacity by way of improved methods and through attractive incentive schemes. Also, installed capacity may not always be equal to licensed capacity because individual or even groups of machines capable of matching licensed capacity may not be available; they may well be of higher or lower capacity. In the context of our limited resources, we feel that in principle there should be no restraint on increased production and on full effective utilisation of capacity. Again, taking the example of structurals and railway wagons, capacity between them could be interchangeable; similarly, sub-contracting may very well result in increased output from installed capacities. It is, therefore, important that the term "capacity" should not be defined in a narrow sense. The IEA will be holding a seminar in Delhi on this important subject later this month to highlight the various aspects of this vexed question. The Government has also set up a Committee to study this matter on which the Association is represented.

We also suffer from the inadequacy of data on the capacity available in various sectors. Taking the foundry industry, for example, apart from the units borne on the DGTD list, there are numerous units in the small scale sector which are not registered and hence their capacity is unknown. Another matter which causes concern is the existence of a certain amount

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*xcerpts from the speech of
S. Sunthanam, Chairman
the Indian Engineering As-
iation (Southern Region) at
9th annual general meeting
March 10, held at Madras.*

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*Dattaram-MEI-14*

imbalance in this sector. ile most foundries are ted in the Eastern Region, nand for foundry products e grown in other regions. ny of these units are also urgent need of modernisa- to be able to be competi- and stay in business.

he Government as well as ustry are fully aware of seriousness of idle capa- es in various sectors. The has repeatedly stressed need to encourage use of ipment developed indigen- ly; the Association's Tech- l & Engineering Services ision has recommended on ous occasions that Indians ıld be appointed as prim- consultants for projects ertaken within the coun- The Mining & Construc- Equipment Division of IEA has been engaged in moting indigenous equip- t and substitutes and is ducting a review of the ing & Drilling Equipment. Association is not in fav- of import of equipment ch can be made in the ntry and for which there nutilised capacity. It is, efore, essential that spon- ng authorities are fully to the changing pattern ocal availability of sub- mblies or intermediaries. he same time, we should ourage the tendency on part of certain equipment ufacturers who hurriedly are drawings and submit to sponsoring authorities before the proper devel- ent of the items, when- they come across adver- ments for equipments in Indian Trade Journal. action only retards the ress of our industrialisa- plans.

### materials

veral critical raw mate- continue to be in acute supply in spite of import el during the past year. ne field of non-ferrous s also the situation is rom being satisfactory. Estimates Committee on and Steel has expressed isappointment over the hat steel production has only around 65 to 70 per of the installed capacity. Government should aim surplus in steel production instead of thinking merely of self-sufficiency.

With regard to the procedure in distribution of iron and steel, representatives of the Association's Southern Region had a recent meeting with the Government of India "Study Group on Indenting and Distribution of Steel" at Madras. At this meeting, the opportunity was taken to make a number of suggestions which we hope will be considered by the Study Group. The Association's headquarters is also submitting a memorandum on the subject. Delays in the issue of sale orders by the various steel plants was highlighted at the meeting and substantiated with specific instances of delays.

With regard to distribution from stockyards, our representatives made a useful suggestion, namely that the Steel Priority Committee should consider the requirement of steel indents in quantities less than wagon loads and after grouping together similar indents from the same region to make up wagon loads, allocate the same to the respective regions and inform the regional representatives of Hindustan Steel to allot these materials to the indentors. I am glad that there is increasing awareness on the part of the Government to discuss these matters with industry and we look forward to the streamlining of various procedures which will enable better production and reduce wastage at all levels.

The IEA Raw Materials Sub-Committee has undertaken a study in depth of the problem regarding non-ferrous metals and has analysed the demand and avaliability of these items.

Our foundries in the southern region have been experiencing considerable difficulties in the matter of supplies of hard coke. Apart from the inadequacy of allotment of this vital raw material, transportation has been posing a serious problem. In an effort to assist the railways, some members in the foundry division decided to pool their requirements to make it possible to load half a rake as it was thought to be easier for the railways to handle such quantity. We are awaiting further advice from the Railway authorities on this matter.

It would appear that the Jt. Director, Transportation (Coke) of the Railway Board, who is the allocating authority for allotment of wagons for movement of coke, is empowered to accept applications sponsored by DGTD or Directors of Industries. The Textile Commissioner who is the sponsoring Authority for textile machinery manufacturers is not included in the list of the Railway Board. This situation has to be remedied and the Joint Director (Transportation) at Calcutta should recognise the Textile Commissioner as one of the sponsoring authorities.

### Exports

The Union Minister for Commerce recently referred to the need for an element of compulsion in the matter of promoting exports. The industry has in the past cautioned the Government that compulsion in exports may be self-defeating as it will encourage foreign buyers to bargain for lower prices. Again, with the shortage of raw materials and the acute crisis in power, it is not understood how industry could meet a compulsory export commitment. We would plead for a co-ordinated effort on the part of concerned ministries to ensure (1) supplies of adequate raw materials, (2) all-out effort to assist industries to generate their own power and as economically as possible, and (3) to create conditions for a positive response from labour for better productivity.

In recent years, most of the developing nations have become keen to set up their own manufacturing units and restrict imports. To meet the challenge of this situation, every attempt should be made by Indian industries to offer package manufacturing proposals to those countries either individually or by way of consortiums. Such joint ventures abroad pave the way for increased export of machinery, components and processed materials, all of which contribute towards foreign exchange earnings. In these circumstances, the Government's insistence on a certain volume of exports as a condition precedent for granting new licences or expansion by the larger organisations is unfortunate, impractical and most likely to be self-defeating.

Cost of production of goods manufactured in India does not compare favourably with that of developed nations. It should be remembered that cost of raw materials and power are significant items in the total cost build-up of engineering goods. To give an illustration, the President of Hindustan Aluminium Corporation observed that the average power cost borne by the Indian Aluminium Industry was over 4.5 paise per kwh as against the world average of about 2.5 paise. This cost discrepancy automatically puts India at a serious disadvantage and makes it more difficult for us to compete in overseas markets.

The share of engineering exports rose from a mere 0.5 per cent in 1956-57 to 8 per cent in 1971-72. About 20 per cent of our exports were absorbed by industrialised parts of the world such as USA, Japan and UK. In spite of the increases recorded in engineering exports, unfortunately the target of Rs 200 crores for 1972-73 would not be reached for various reasons. Some of the reasons appear to us to be; (a) Non-traditional goods face severe competition abroad; (b) High cost of production in our country; (c) Shortage of raw materials especially iron and steel; (d) High freight rates; (e) Capacity constraints due to uncertainties in investment climate; and (f) Shortage of power which is now becoming intensely acute.

The Government and industry should meet more frequently to consider ways and means of creating a suitable climate to accelerate exports by removing procedural bottlenecks and ensuring prompt decisions.

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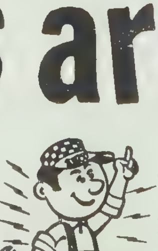

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### ower crisis

are faced with an un-
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wer almost all over the
ry. The Union Minister
Irrigation and Power
ved the other day that
power is already short of demand by 15 to 20 per cent in the country. Most of our States are hit by this problem and in Tamil Nadu, the third industrialised State in the country, the situation has been deteriorating rapidly since last October.

The southern region is at a disadvantage in a variety of ways; it has suffered from the failure of monsoons which feed the hydel reservoirs; the sources of coal are located at considerable distance; transportation of coal from the country's north-eastern region has been paralysed due to the unfortunate political conditions in Andhra Pradesh. Mysore, which was in a relatively comfortable position until recent months, has had to impose a 25 per cent cut on its industries. Andhra Pradesh too is facing a very difficult situation. It is reported that Kerala is not in a position to assist the neighbouring States any longer. In Tamil Nadu, the cut in power supply which started with 25 per cent in October, went upto 40 per cent in early February and rose to 75 per cent from February 15. The Tamil Nadu Electricity Board has had a series of dialogues with industry on this issue and the industry in turn is appreciative of the situation and is willing to do its best in meeting the crisis. Many establishments which are eager to set up their own captive power units as quickly as possible are unfortunately handicapped on two accounts —non-availability of indigenous generating sets and the delays due to procedural formalities in arranging import of such equipment.

The Association strongly feels that in a matter of grave emergency of this nature, the Government should come forward to assist in every way to eliminate delays and reduce the procedural formalities for import. We have come across instances where a company has not been able to get clearance for import of high capacity generators on the ground that capacities exist for manufacture in our country. Unfortunately, in an emergency, it is not possible for the indigenous manufacturer to make quick deliveries of equipment and this is a fact which Government cannot ignore.

We have also pleaded for relief in the matter of excise duty and sales tax payable for diesel/furnace oil to run the generators. There should be complete exemption from excise duty on furnace oil to the extent of its use in operating any unit for power generation. Similarly, the State Government should also take steps to grant exemption from sales tax. The Tamil Nadu Government has also imposed a 15 per cent surcharge on the electricity rates. While we realise that this levy will fetch about Rs 6 crores to the Electricity Board to meet increased costs of operations, it should not be forgotten that consuming industries, which are already facing financial crisis, will be further hard hit and the levy, as a leading economic weekly calls it, amounts to a "levy on loss".

We hope that the Government even in their own enlightened self-interest will come forward to assist industry in these sectors taking a realistic view of the situation. I would further suggest that the Government and the State Electricity Boards should take the industry into confidence and seek the advice of its technical personnel in the matter of power generation. Wherever capacities exist in essential/priority sectors for generating power, they should be encouraged to operate them to the fullest extent, so that some energy may be saved for being used by other sectors of the industry. A certain amount of sacrifice is desirable in all directions in an all-out drive for conserving available energy.

During the past few months industry has faced the challenge with confidence and by ingenuity, innovation and prudent management has tried to avoid laying off workmen as far as possible. Our efforts to provide continuing employment to workmen is seriously threatened by the steady deterioration in the supply of energy. We sincerely hope that the Government will impress on leaders of trade unions to appreciate the situation and co-operate with managements in working out suitable schemes of regulating employment during the period of power cut.

As a long-term solution, the Government of Tamil Nadu has pleaded for a second mine cut and another thermal station at Nayveli. A task force set up by the Tamil Nadu Planning Commission has observed that nuclear power generation is ideal for the State and that work on a second nuclear project should start at the beginning of the Fifth Plan in the State. Recent experience shows that dependence on hydro power should be reduced in order that the adverse influence of the vagaries of monsoons is minimised. There is, therefore, need for greater emphasis to be laid on thermal power including nuclear power. It is reported that there would be no difficulty in obtaining equipment from indigenous sources to meet the power development programmes of the Fifth Plan. I would even suggest that, if necessary, the Government should not hesitate to import power generation equipment in the overall interests of economic growth. Attention must also be paid to assist manufacturers of power plant equipment to ensure full utilisation of capacities by means of adequate supply of components, testing facilities for turbo-generators, etc. Dr K. L. Rao even suggested putting up "power factories", i.e. installation of giant thermal plants at coal pitheads instead of locating them at consuming centres as at present.

### Industrial licensing

Uncertainties in the Government policies are not conducive to investment and it has led to a slowdown in investment. The Government of India, however, announced changes in the industrial licensing policy early in February this year. The announcement also makes reference to the scheme of joint sector. The question still arises as to what extent

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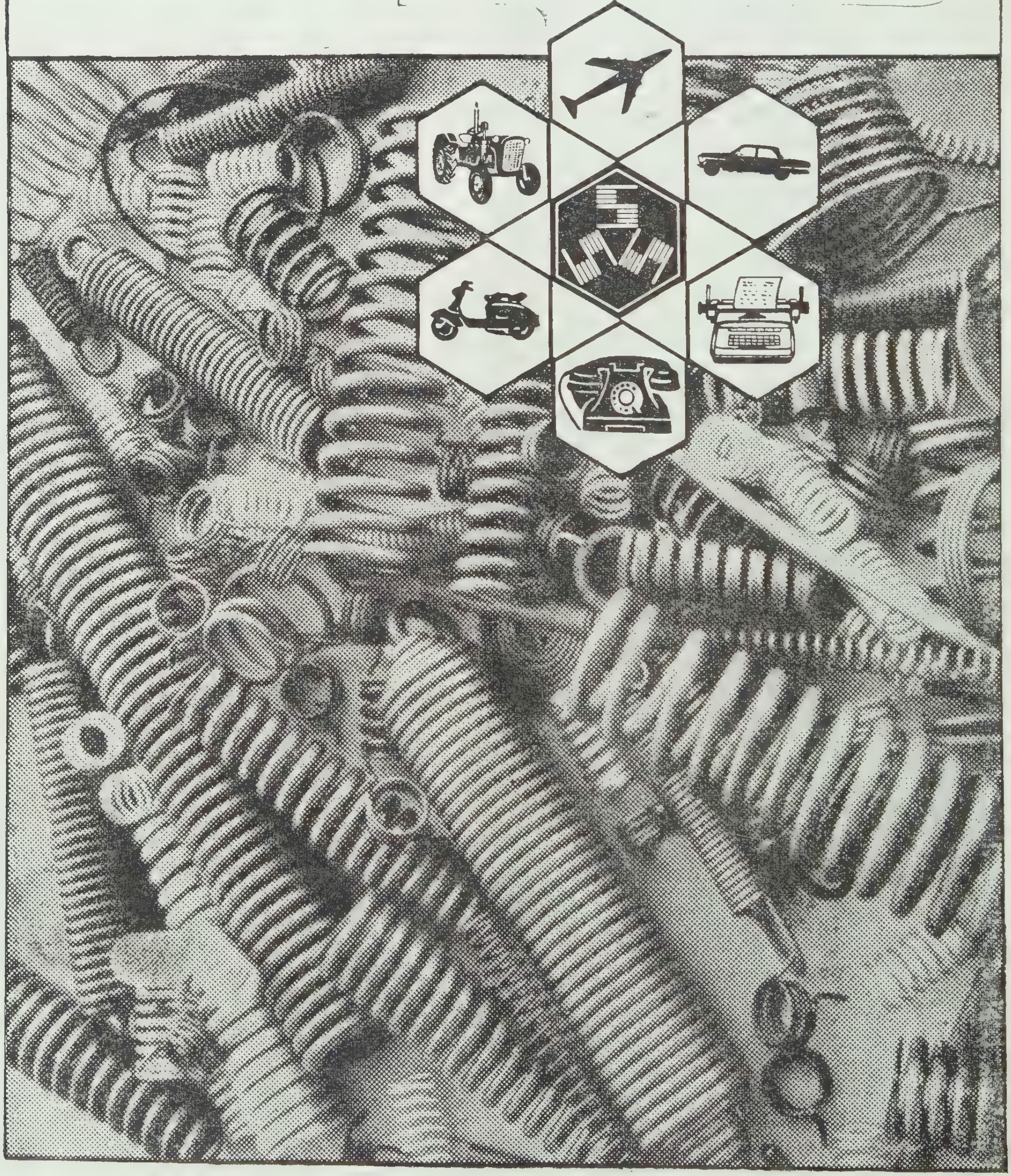

Dattaram-SSS-3

ould the Government exer- se control in the manage- ent of joint sector enter- ises.

The Association has from ne to time taken up with fferent State Governments d purchasing agencies the ed to waive earnest money posit in the case of firms gistered with DGS&D. The gic of our arguments has en accepted by a number State Governments but a w authorities such as the rt Trust have not acceded our request. Where there already successive erosion working capital, industry is stified in looking to the vernment for relief in mat- rs such as this. Secondly, a mber of members of the sociation have faced the oblem of wage escalation in pply contracts. At the time tendering, a contractor uld only estimate the im- ct of time scale wage in- eases on the basis of exist- g scales of pay. Wages and her conditions of service are vised periodically mostly rough bipartite negotiations thout recourse to Govern- ent machinery—in keeping th the policy of the Govern- ent to encourage collective rgaining. It is therefore perative that increases in bour cost arising from such tlements should be accept- by the DGS&D. I hope this d other similar important ints already taken up th DGS&D by the IEA, ll be implemented.

Research and Development s been a subject matter of nsiderable discussion during e past year and we have deavoured to establish oser liaison between the re- arch institutions and indus- y. In Madras we had a ry useful meeting with the icials of the Council of ientific and Industrial Re- arch as a first step for closer ison and we hope that in- stry will be enabled to ex- oit fully the results of re- arch. The efforts of industry d research bodies should be mplementary and we look ward for better communi- tion between them. The A has submitted a compre- nsive memorandum on the bject of R & D to the Government. I do not wish to go into the details of the IEA memorandum except to stress that there is need for a precise understanding of what is meant by R & D, especially the aspect of development. Several companies have invested in R & D work; in many cases, however, there may be no separate R & D department but considerable investment is made on "development" work. Unfortunately, capacity constraints, concepts such as monopolies and dominant undertakings, inhibit major industries from commercial exploitation of the results of research.

In these circumstances, the major burden of conducting research has fallen on national laboratories. It is gratifying to see that the CSIR has recently re-oriented its policy towards a greater emphasis on applied research. We certainly hope that adequate pilot plant facilities would be provided in the national laboratories.

One of the significant developments in this field during the last year is the raising of the minimum bonus to 8-1/3 per cent. The Bonus Review Committee has, however, not concluded its deliberations. The Union Government is also undertaking a comprehensive revision on the subject of industrial disputes by bringing in an Industrial Relations Bill.

A recent study by the Reserve Bank of India reveals that the increase in remuneration paid by the engineering industry has far outstripped increases in value of production during the period 1965-66 and 1970-71. There has been a steady erosion in the profitability of the industry due to this as well as rise in prices of other inputs such as raw materials, fuel, etc. If this trend goes on unchecked, we may soon find ourselves totally priced-out in export markets.

The engineering industry, particularly in this Region, has a record of providing good wages and benefits to its employees and these compare most favourably with the rest of India. I am, however, disappointed that inter-union rivalries have reached such serious proportions as to unsettle validly concluded agreements between employers and employees. The existing law enables a trade union, regardless of its representative capacity, to challenge a subsisting settlement in a company and unless this situation is remedied by the goodwill of the trade union leaders and the Government, industry cannot prosper.

We have instances where an employer is summoned to appear at conciliation proceedings to discuss the issue of bonus payment at the instance of a minority union even when the company has already paid the maximum under law by an agreement with the recognised union. Such situations tend to create uncertainties and put a premium on pressure tactics. I am also constrained to refer to the malaise of "go-slow" tactics frequently adopted by workmen in many establishments in recent years. This is even more serious than a work stoppage and causes great national loss. It is earnestly hoped that the Government, in the larger interests of society deals with such matters promptly and firmly. □

# Hurdle of power shortage

**By S. Ranganathan**

THE most important problem today is the scarcity of electrical power, which in modern life has become a basic requirement, even for reasonable living, not to say for progress and prosperity. In recent years, we have got used to live with shortage of one kind or another, but we appear to have assumed that power will be available, as required, forever, not that there have not been individuals here and there who have cautioned us in this regard.

Power generation has been given a very high priority in our Five-Year Plans and planning in all other spheres has proceeded on the basis that power generation will keep pace and not lag behind and economic growth will not be adversely affected for want of power. Yet we find that at the end of the Fourth Five-Year Plan we are literally powerless to keep the wheels of industry moving, not only in the south but also in the north. All the hopes that we roused that even villages will be electrified have proved illusory.

Many people blame the failure of the monsoon last year for the crisis in the northern, western and southern parts of the country. Failure of rains is not an uncommon phenomenon in our country, and if a poor monsoon during one year can cause such havoc, I dread to think what will happen if the rains fail again next year. I do not wish to sound as a prophet of doom. I hope the present crisis will provoke the Central and State Governments to go deep into the matter as to where planning for power had gone faulty. Did we not provide for contingencies like failure of monsoon? Did we rely over-much on hydro-electric generation without adequate balancing by generation by other sources etc. Cost of idle equipment due to shut-downs, technically known as 'outages' should be of colossal proportions.

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*Excerpts from Mr Ranganathan's speech at the ninth annual general meeting of the Association. Mr Ranganathan is Chairman of Ashok Leyland Ltd.*

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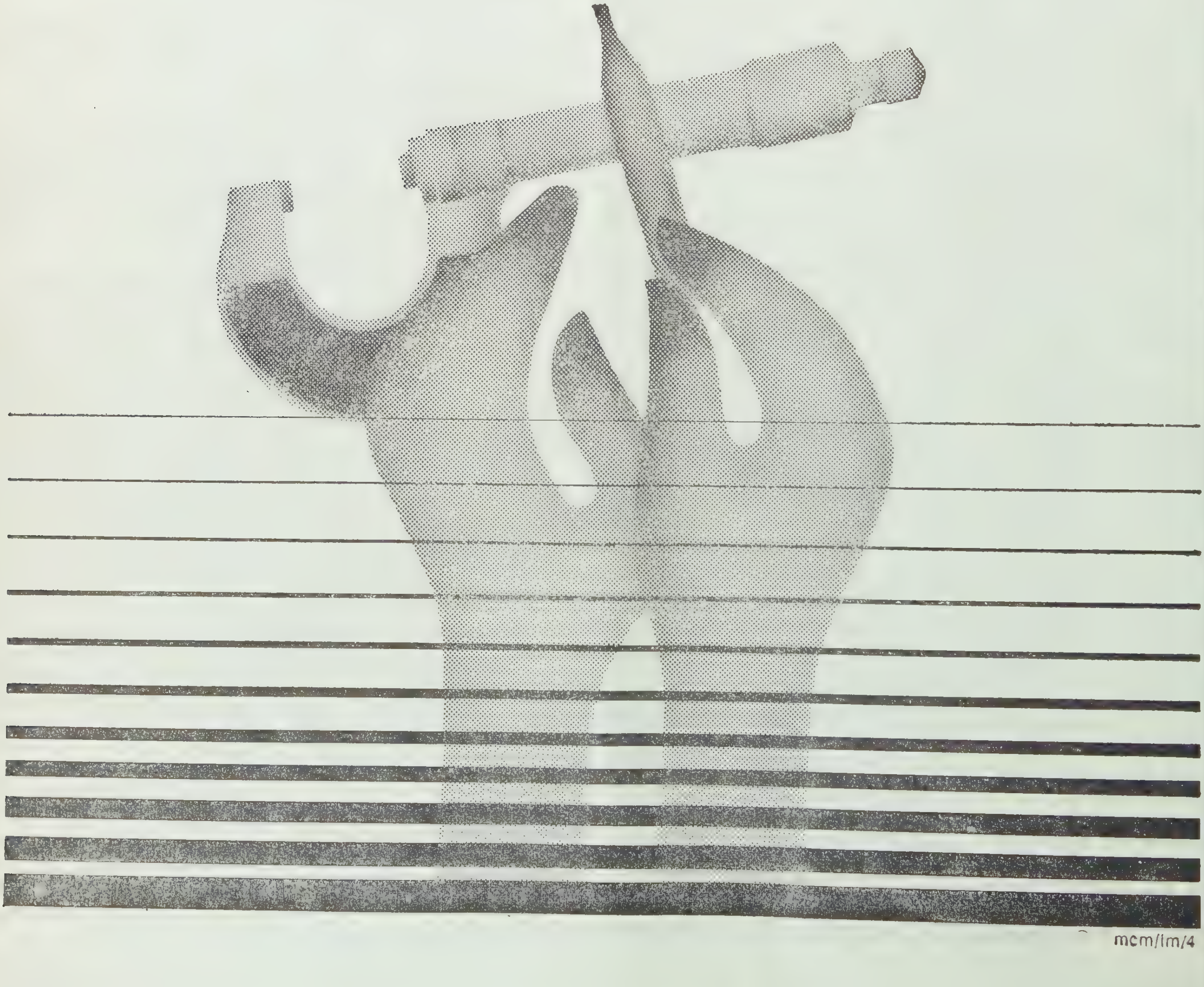

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Possibly undue enthusiasm in licensing industrial units, without regard to power availability, has cut into the reserves of power plants, if such reserves had been provided. Obviously all shortages could not be attributed to nature having failed us.

In the eastern regions of the country, in particular, human failure also seem to be responsible for the crisis. Lack of proper maintenance of equipment leading to large scale break-down, lack of adequate backing of spares and replacements, delays in coal supplies from mines, and man-made impediments to coal movements are also stated to be responsible for the inadequacy of power. The result of all these failures is that the first half of the year 1973 threatens to be a dark period for the country and the Industry, in more ways than one.

The Government of Tamil Nadu has formed a team of advisers representing the various industries including the engineering industry. I hope this team will be able to go into the question in depth and not merely advise the Government regarding immediate palliatives but also on short-term and long-term remedial measures.

Before I pass on from the subject of power shortage, I would like to bring to your attention some figures regarding power generation and utilisation published recently in the Press. I believe, the daily power generation in the three southern States of Kerala, Tamil Nadu and Mysore during 1972 was about 35 million units against an estimated requirement of about 45 million units. This straightway indicates a shortfall of 10 million units even in the installed capacity. If we add to this the very high rate of transmission losses of 17 to 18 per cent (against a maximum of about 10 per cent in advanced countries) the picture is not a happy one at all. Transmission losses, I am told, cost by way of non-yielding investments, about 50 crores of rupees for each one per cent. If so, we are bound to run into trouble, even without monsoon failures or failures in coal supplies, at this rate. One of the major contributory factors to this shortfall appears to be the fact that the three large power generation units in the South viz: Sharavathi, Ennore and Kalpakkam have slippages of 90, 240 and 200 mw respectively against Fourth Plan targets for generation.

There is some talk about importing of generating sets and taking steps to increase indigenous manufacture of such sets. Such steps will not solve the problem for this year. Importing generating sets from abroad, even if they are available from the shelf and we have the requisite foreign exchange, is going to take time. They will have to be transported by sea round the Cape, and by the time the sets are put to use, God willing, the rains would have come and there may be anxiety to give up such action. This "Stop - Go" - "Stop - Go" attitude should not be allowed to impede our growth. Well-considered long-term measures should be taken and pursued to the end. Otherwise, not only industry but also Agriculture will suffer.

The plight of the industry in the south seems to have reached a state where even the most optimistic person is likely to be reduced to a state of jitters. Some of the large industrial concerns of the South had a very bad year in 1972 due to labour unrests and production fell in many cases to less than 60 per cent of capacity. If in the year to follow, it is again reduced to 60 to 70 per cent of the capacity due to power shortage, I wonder how many entrepreneurs will, unless there is some assurance of remedial action have the heart or the means to plan for expansion and it may well be that growth may be retarded for 2/3 years and the Fifth Five-Year Plan may start off on the wrong foot.

On the labour front also the lay off due to power shortage is going to cause considerable hardship and managements may find it difficult even to meet the minimum demands of labour. Irresponsible persons may tend to take advantage of such a situation. I think managements would be well advised to take such measures as they can to keep their labour as happy as circumstances permit and ensure that a climate is created, which cannot be exploited by interested parties. Public men who have the interest of the country at heart will, I hope, actively come out and see that false hopes are not roused in the minds of labour, which cannot be met either by the Industry or the Government.

Compared to these two problems I have mentioned viz: electrical power and man-power, all other problems of the engineering industry in the South seem to pale into insignificance. We are bound to have shortages of materials and I do hope the industry will be able to cope with the situation, as it has coped with many similar situations in the past.

We have excellent machinery in bodies like the Indian Engineering Association to set up their own working groups or study teams to anticipate problems of this kind and to represent them to the Government and mitigate the impace of such situations, even if they cannot altogether be avoided. It is not enough to say that someone else or some other machinery failed. We have to recognise the fact that even Governments have limitations and we should strive to put forward in time constructive suggestions. ☐

# Services to industry

THE Indian Engineering Association is the premier industrial association of engineering interests in the country. The Association has a long history dating back to the year 1895.

The Association which initially had 12 members has grown steadily and now enjoys the support of over 550 member companies, large, medium and small, including a number of well-known public sector organisations. Members of the Association employ over 6 lakhs of persons; represent an investment of over Rs 2,320 crores manufacture and handle more than 2,000 groups of items; and contribute to more than 58 per cent of the total engineering exports from India.

The members account for over 68 per cent of the total employed capital in the engineering industry in the country.

The Southern Region of the Association was started in 1964 with 33 member companies and today it has 97 members representing almost all sections of the engineering industries.

The Association has four regional offices for the eastern, northern, southern and western regions with headquarters in Calcutta. Having regard to the heterogeneous character of the industry, a number of divisions have been set up within the Association to focus attention on those sectors. These divisions include heavy engineering, foundry, electrical and ship-building. These divisions are managed by divisional committees and operate on an all-India basis.

The Association's affairs are administered by an Executive Council with adequate representation from all

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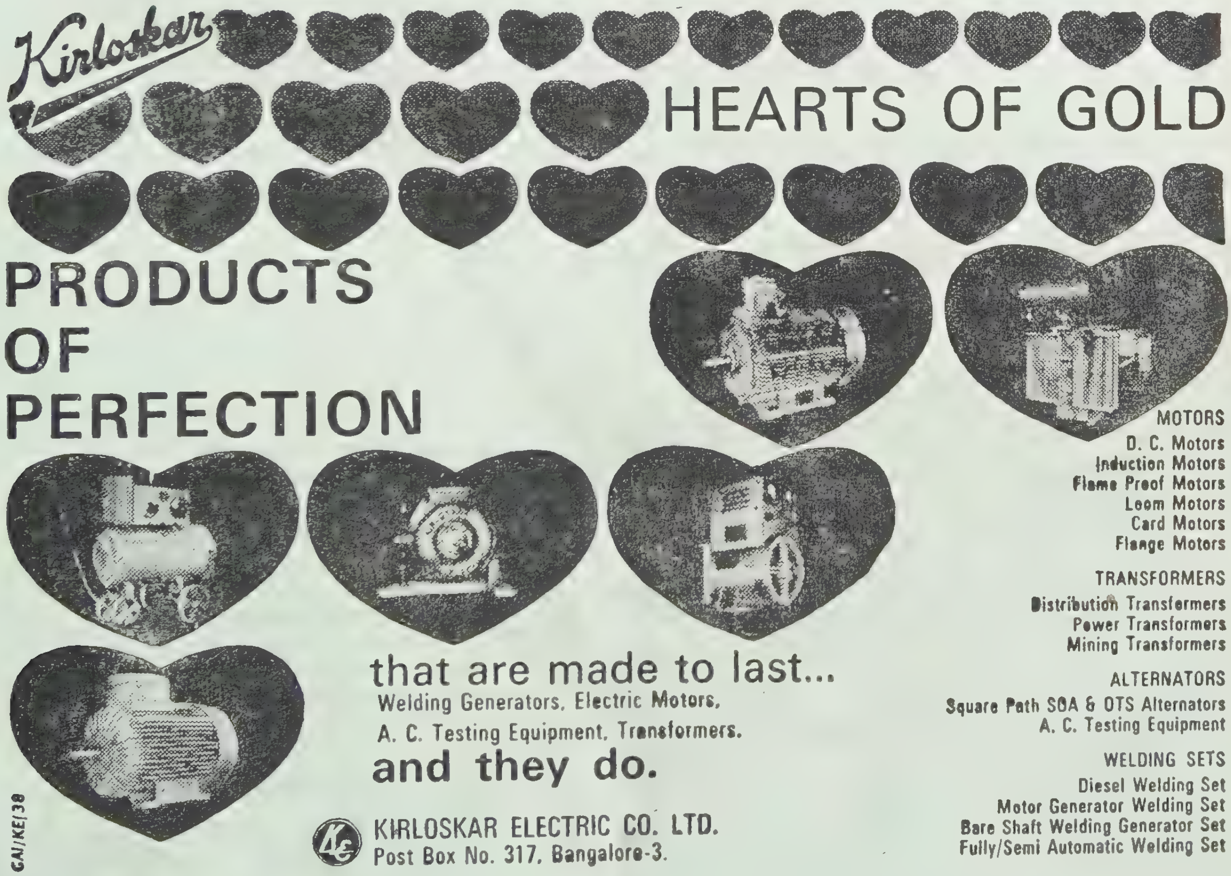
egions. Each regional office ' the Association comes nder the control of separate egional committees. In adition, the Association at its eadquarters and at regional vels has set up sub-comittees to deal with speciased subjects such as raw aterials, exports, etc.

As an Industrial Associaon, IEA provides a variety services. The IEA acts as e industry's spokesman bere various authorities on atters such as finance for e industry, raw materials, dustrial development, forgn trade and industrial lations, and in turn keeps embers fully advised of all matters concerning the engineering industry. The Association at its headquarters has from time to time brought out a number of publications some of which are: (1) Guide to Industrial Licensing Policy; (2) Handbook of Price Variation Clauses; (3) Manual of Engineering Trades; (4) Export Documentation; (5) Export Agency Agreements; (6) Exports and the Engineering Industry; (7) Productivity Oriented Personnel Policy; (8) How to Conduct a Domestic Enquiry; (9) Directory of Members.

The IEA has an annual publication on statistics—Handbook of Statistics and a monthly news bulletin.

The Association's role has been recognised by the Central as well as the State Governments. The Association is represented on various bodies such as the Central Purchase Advisory Council, Engineering Export Promotion Council, various committees of the ISI, Railway Equipment Advisory Committee, Iron & Steel Advisory Council, various State Labour Advisory Boards. The Association has recently produced a documentary film on the engineering industry highlighting the industry's growth.

In the field of industrial relations, the Association at all regional offices provides expert advice to members on all matters concerning the subject. Representation before various authorities under labour enactments such as Labour Courts and Industrial Tribunals is also undertaken. One of the objectives of the Association is to encourage sound personnel policies among member companies in order to foster healthy industrial relations. In order to achieve this objective, the Association collects and provides information on the terms and conditions of service prevailing in different companies. ☐



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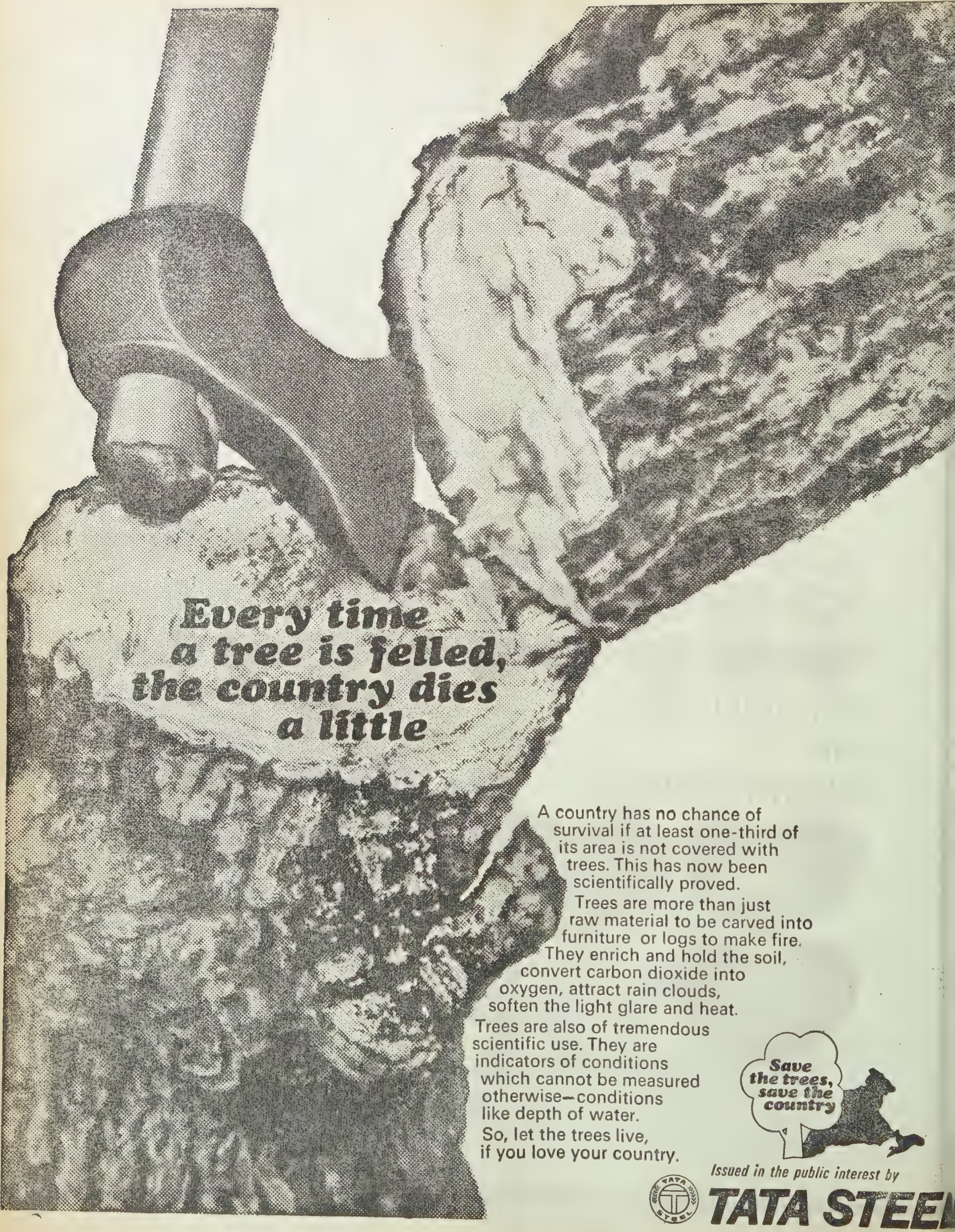

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# Foundries and refractories

—A FEATURE

## An under-utilised industry

y a special correspondent

THE foundry units are in a quandary. Most of the 000 units are working below apacity. In the ferrous sector, the capacity utilisation anges between 50 and 70 per ent. For the non-ferrous oundries, the utilisation is bew 60 per cent. The undertilisation in the foundries is n account of acute short supy of raw materials.

Hard coke is in shortage. It now priced Rs 700 per onne. Three months ago coke rices were round Rs 315 per onne. Mr F. A. A. Jasdanalla, Managing Director of ndian Standard Metal Company, says that the coke rices are a source of headche to the foundries. Natioalisation of coal mines has ot improved the supply posion. In fact the situation has orsened and the prices are oing up. It is very necesary that some machinery hould be evolved to see that e prices of essential raw aterials do not go up abormally. Such price rises ake economic production ifficult for the industry.

Foundry grade pig iron for e ferrous units is also in hort supply. The price now anges between Rs 500 per onne to Rs 515 per tonne. he foundry units contend hat the wagon shortage has affected the supply of pig iron to the industry.

In the case of non-ferrous sector, the supply situation is more critical. Almost 90 per cent of the requirements of copper, tin, zinc, lead, nickel and other non-ferrous metals required by the non-ferrous foundries have to be imported. The suspension of sale notes by the Minerals and Metals Trading Corporation has added to the difficulties of the users. The small units complain that a high margin is charged by the MMTC. In the first quarter this year copper was released by the MMTC at price of Rs 14.60 per kg including pofit and its trading margin of about 12 to 15 per cent. There are reports in the markets that the price may go up to about Rs 19 per kg from the quarter beginning April 1 this year. The maximum margin allowed to the importers before the canalisation was 3.5 per cent. With the import of copper by the public sector organisation the handling charges and margins are constantly going up.

In the case of aluminium, there has been a cut by the producers. The power cut in Tamil Nadu has forced stoppage of production since February by the Madras Aluminium Company. Thus the demand for aluminium in the southern region would have to be met from other sources. All this is likely to push up the prices in other markets.

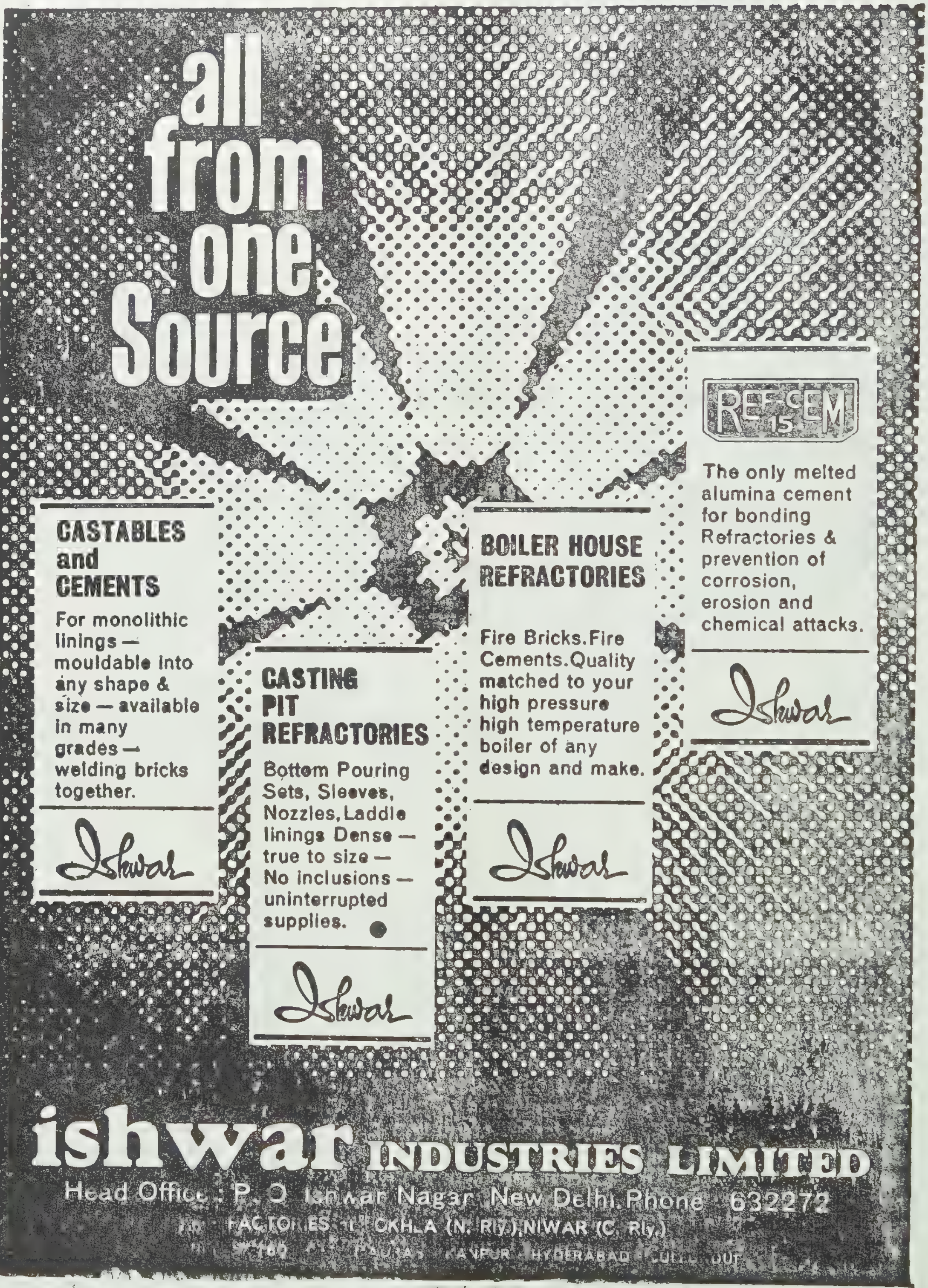
The increase in prices of castings would have an impact on the production costs of the engineering units. Foundry units contend that the Government should look into this state of affairs.

The constraint on the development of the non-ferrous foundries also arises from the fact that 95 per cent of these units have old and obsolete equipment. Moulding machine production started in the country a few years ago. But these are based on obsolete designs. In the Western countries there has been a lot of development in the foundry equipment industry. But this technological revolution has not yet reached here. The industry contends that the import restrictions are coming in the way of development of the industry.

Castings in some form or other are required for the engineering units. With the development in engineering industries there has been a gradual development of foundries specialising in castings. However, for some time past the engineering industries have shown a slower growth rate. This is particularly so in the case of machine tools and electrical equipment. This slow-down has also affected the development of modern foundries.

The shortages in non-ferrous metals had led to search of alloys. Thus aluminium alloy sand castings and die castings developed as part of the import substitution programmes. The industry is confident that with greater availability of aluminium in the future, aluminium alloy casting exports would grow. The industry is now in a position to meet about 95 per cent of the local requirements of non-ferrous castings. Imports are restricted to very big sizes and heavy castings.

With three new steel plants planned and programmes on the anvil for the expansion of the existing units, the demand for special types of high conductivity water-cooled copper castings will increase. This is an area where development work has to be done to meet the demand.



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There is little of research nd development in the foun-lries. Since a large number f the units are in the small ector the necessary equipment is also not there. Some of the larger foundries do have their own laboratories. But research there is confined to day-to-day problems that arise on the shop floor. A co-ordinated research and development programme by government-owned laboratories and the industry in respect of raw material and sands is needed. The types of sands available and their properties have to be studied. ☐

# The uses of refractories

METALLURGICAL operations employing high emperatures demand suitble materials to serve as eceivers for the molten netal, that is hearths, botoms of furnaces and rucibles. Also to resist the igh temperatures of hot ases in furnace flues and assages. But in addition to he ability to resist softening t the operating temperaures other deteriorating facors have to be taken into ccount in the choice of suitble material for any partiular operation. Such mateials which can withstand igh temperatures and resist he action of slags are called efractory materials. These naterials have melting points bove 1,580°C. Those mateials which have melting oints above 1,790°C are alled highly refractory naterials.

The properties of good reractory materials are: (1) It nust not soften or fuse at he temperature at which it used; (2) It must withstand udden changes in temperaure; (3) It must have suffiient mechanical strength so s not to crumble or not to rack under working pressure hen in use at high temperaures; (4) It must have low oefficient of expansion and ontraction; (5) It must have igh resistance to corrosion y metal, matte or slag in ontact with it; (6) It must ot allow the gases and iquids to permeate; and (7) Vhen used in electric furaces, it must have low electrical conductivity. In actual practice no material satisfies all the above requirements but there are many which closely approximate to above conditions.

According to their chemical behaviour, the refractory materials are classified into: (*a*) acid, (*b*) neutral, and (*c*) basic.

(*a*) Acid refractories are those which readily combine with bases. They mainly contain silica. Among the important acid refractories are quartz, sand and ganister.

(*b*) Neutral refractories consist of substances which do not combine either with acidic or basic oxides. Typical materials like graphite and chromite fall in this category.

(*c*) Basic refractories contain mainly basic oxides without free silica and resist the action of bases. Typical materials are magnesite, dolomite and lime.

There are two types of acid refractories: (1) those containing silicon dioxide; and (2) those containing aluminium silicate or clay. Silica when pure fuses at a very high temperature but forms silicates when it comes in contact with basic substances. Silica occurs as quartzite, Dinas rock, sand and ganister. Ganister is naturally occurring. Silicious rock contains about 98 per cent silicon dioxide. Gaya and Monghyr districts of Bihar have good deposits.

Silica bricks are manufactured from quartzite rock. The rock is crushed and graded. It is then mixed with a binder to hold silicon dioxide particles together. The mixture is pressed into iron moulds and the moulds are dried slowly on the floor of a drying shed heated by flues from underneath. The bricks are finally fired between 1,350°C to 1,500°C in kilns for 7 to 10 days.

Silica bricks are extremely hard and refractory. They withstand load conditions satisfactorily even at such high temperatures as 1,600°C under a pressure of 50 lb per sq inch. However, silica bricks cannot withstand thermal shocks. They show a great tendency to crack when subjected to rapid fluctuations of temperatures. Therefore, silica bricks are unsuitable (1) for those parts of furnace which are exposed to cold draughts of air, (2) for lining of furnaces which are allowed to cool down frequently as in case of crucible furnaces for gold, silver or brass melting, and (3) for the lining and arches of annealing or roasting furnaces working only around 800°C temperatures. These are extremely suitable in furnaces which are subjected to very high temperatures as in open hearth and electric furnaces in steel making, copper smelting and refining furnaces.

Fireclays are naturally occurring earthy materials composed mainly of hydrated aluminium silicate. These are of two varieties namely plastic or flint clays. The less plastic variety is very hard and highly refractory. Fireclays are found in Bihar, Orissa, Madhya Pradesh, Tamil Nadu, West Bengal, Andhra Pradesh and Gujarat.

**Capacity utilisation in the refractories industry**

| Year | Capacity | Production | Percentage capacity utilisation |
|---|---|---|---|
| 1951 .. | 290.4 | 237.6 | 81.8 |
| 1952 .. | 290.4 | 243.6 | 83.9 |
| 1953 .. | 289.2 | 228.0 | 78.8 |
| 1954 .. | 330.0 | 240.0 | 72.7 |
| 1955 .. | 330.0 | 274.8 | 83.3 |
| 1956 .. | 330.0 | 318.0 | 96.4 |
| 1957 .. | 472.8 | 367.2 | 77.7 |
| 1958 .. | 536.4 | 434.4 | 81.0 |
| 1959 .. | 764.4 | 499.2 | 65.3 |
| 1960 .. | 790.8 | 550.8 | 69.7 |
| 1961 .. | 802.8 | 626.4 | 78.0 |
| 1962 .. | 836.4 | 670.8 | 80.2 |
| 1963 .. | 884.4 | 654.0 | 73.9 |
| 1964 .. | 960.0 | 687.6 | 71.6 |
| 1965 .. | 1,081.2 | 696.0 | 64.4 |
| 1966 .. | 1,239.6 | 716.4 | 57.8 |
| 1967 .. | 1,239.6 | 747.6 | 60.3 |
| 1968 .. | 1,081.2 | 661.2 | 61.2 |
| 1969 .. | 1,080.0 | 621.6 | 57.6 |
| 1970 .. | 1,096.0 | 745.0 | 68.0 |
| 1971 .. | 1,096.0 | 785.0 | 71.6 |
| 1972 .. | 1,096.0 | 399.8(*a*) | — |
| Compound annual rate of growth between 1951 and 1971 .. | 6.9 | 6.2 | — |

NOTE: (*a*) Figure refers to period January-June 1972.

SOURCES:

(1) For the years 1951 to 1969, Central Statistical Organisation, Department of Statistics, *Monthly Statistics of the Production of Selected Industries of India*, Various issues, Calcutta.

(2) For the years 1970 and 1971, Ministry of Industrial Development, Government of India, *Annual Report 1971-72*, New Delhi.

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The manufacturing process fireclay bricks is similar that of silica bricks. The ay in a finely crushed con- tion is mixed with water a fixed proportion in a ıgmill. The mixture is then essed into moulds, dried d finally burnt. While ing flint clays (or less astic), plastic clay is em- oyed as binder. By alter- g the proportions of flint ay and the plastic clay in e mixture the properties of icks made can be con- olled.

Because of wide variation the composition and mode manufacture using fferent proportions of plastic d flint clays, the properties fireclay bricks vary wide- . Though chemically pure, eclay is neutral as regards chemical behaviour. It be- mes slightly acidic in aracter and its ability to thstand attack of basic ags is unsatisfactory. It is, wever, not acidic as silica icks but may be considered between neutral and acidic. reclay bricks have low co- icient of expansion and are perior to silica bricks as far resistance to spalling is ncerned. They are less re- ctory than silica bricks but cheaper.

Typical uses of fireclay icks are: (1) construction reverberatory furnaces rking at moderate tempe- tures, (2) for the lining of rnaces which are allowed cool down frequently as quired for crucible furnaces melting copper alloys, ver, gold, etc, (3) linings of ast furnaces for smelting of n and copper ores.

*Basic Refractories*: These magnesia, lime, dolomite, rome magnesite and bauxite.

*Magnesia*: It is one of the st refractory materials. Its elting point is 2,500°C in re form and 2,165°C in ick form. Austria and ngary are main sources of pply in the world. In India, agnesite is obtained in ysore and Tamil Nadu.

The manufacture of mag- site bricks differs in comparison to other refractories in the fact that these bricks have to be burnt twice. Magnesite is first burnt between 1,500°C to 1,700°C. This process is known as "dead burning". The dead burnt magnesite is then crushed with water. Iron oxide acts as a binding agent. If iron oxide is not present in the natural deposit it is added. The material is mixed with very little amount of water and in special cases with sulphite lye. The mixture is then pressed into bricks under heavy pressure. These are then dried and burnt between 1,400°C and 1,500°C. High finishing temperatures are used to reduce the after-shrinkage to reasonable proportions. Magnesite loses strength at about 1,500°C. The bricks are not capable of withstanding sudden changes in temperature.

Magnesite refractories are costlier than silica and fireclay bricks and are used in the construction of those parts of a furnace which are required to withstand corrosive action of basic slags. Magnesite bricks are used in (i) basic open hearth furnace, (ii) arc furnace and hot metal mixers, (iii) copper converters and all other furnaces producing non-ferrous metals.

*Lime*: This basic material is almost infusible and stands intense heat of oxy-hydrogen flame. But its slaking property makes it a worthless material as a refractory.

*Dolomite*: It is a double carbonate of calcium and magnesium. It is abundantly available in India. It is extensively used for repairing the banks and bottoms of basic open hearth furnaces.

*Chrome-magnesite*: It is made by mixing magnesite and chromite. This refractory has high thermal shock resistance and greater under-load property. The only drawback is its bursting tendency at high temperatures.

*Neutral refractories*: These refractories permit both acid and basic processes to be conducted on the same lining. These are the ideal refractory materials. Natural deposits of these refractories are not large. Their use therefore is restricted only to special purposes. The main refractories in this type are carbon and chromite.

Carbon occurs as a natural product graphite mixed with calcareous and siliceous rocks in Siberia, Austria, the USA, India, the UK and Brazil. It is artificially prepared by mixing petroleum coke with hot tar as binder and then graphatized after shaping.

It is used in the bottom side and bushes of cupola and furnaces employed in iron and steel industry. The main properties are (*a*) resistance to slag; (*b*) resistance to heat, load and chemical action during service; (*c*) low shrinkage; (*d*) oxidation of metal is less and so the life of furnace is prolonged, and (*e*) it can be made to accurate sizes.

*Chromite*: When pure, it fuses at a temperature of 2,180°C and is the ideal refractory available. The method of manufacture is similar to that of magnesite except that primary burning is not required. Straight chrome bricks are not used very often but it is mostly replaced by chrome magnesite bricks. Chromite bricks are mostly used in between basic and acid linings in the basic open hearth furnace. Their cost is prohibitive for more liberal use. Chromite disintegrates if cooled too quickly and is unsuitable under load at high temperatures.

*Kyanite and sillimanite*: These minerals have the same chemical composition but differ in physical properties. It occurs in Khasi Hills of Assam, Singbhum in Bihar and in MP. Significant features of these refractories are (i) high fusion point of above 1,800°C, (ii) very low coefficient of thermal expansion, (iii) neutral in character and very resistant to the corrosive action of many slags, (iv) great mechanical strength at high temperatures and (v) resistance to spalling. ☐

# The working of foundries

**By a special correspondent**

A FOUNDRY is where components of desired shapes are produced by melting a given metal and pouring it in a mould. The essential operations involved are: (i) preparation of a pattern; (ii) preparation of sand for moulds; (iii) preparation of moulds; (iv) melting the metal; (v) casting the molten metal; and (vi) cleaning of castings.

Metal castings are produced by pouring molten metal into moulds having the desired shapes and sizes and by allowing the metal to solidify. The pig iron and scrap are melted in a cupola or in an air-furnace. Non-ferrous metals are usually melted in crucibles.

*Melting methods*: Gray iron is usually melted in a supola, an induction furnace, or an electric arc furnace. The major but decreasing percentage is melted in cupolas. The composition of the melt is determined by the charge materials used; it is adjusted by operation of the melting equipment and by addition of inoculants and alloying elements, to castings that are within specified property limits.

Melting practice of gray iron is important, because for given raw materials and speci-

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d final composition it can ect the solidification pat- n of the iron, the shape d distribution of graphite kes, and the effects of sub- quent inoculation. These ects are related to oxida- n levels, gas content and lten iron time temperature cles which are different for ferent furnaces.

Selection of melting equip- nt for gray iron depends many factors including availability of funds, v materials, energy and our that are locally avail- le, and the volume and ads of castings to be made.

There are no simple rules d each application must be oroughly investigated for own location. The salient tures of comparison are as lows:

| *Characteristic* | *Cupola* | *Coreless induction furnace* | *Arc furnace* |
|---|---|---|---|
| pe of operation .. .. | Continuous | Continuous or batch | Batch |
| ape .. .. .. | Cylinder | Cup | Saucer |
| rce of energy .. .. | Coke | Electricity | Electricity |
| ntrol of composition .. | Fair | Excellent | Excellent |
| pital cost compared to upola .. .. .. | 1 | 6 times | 6 times |

The cupola is commonly ed in an iron foundry and consists of a cylindrical ell of boiler plate, lined th firebrick and resting on quare bed plate which has round central opening of size of the inside of the ing. The bed plate is pported on four cast iron s above the ground. The ver opening of the shell is vided with two semi- cular outward opening ors which are hinged on periphery. When the ors are closed they are d in position by an up- ht iron rod located cent- ly under the doors. These ors protected by a sandbed de on them support the rge during heating. When y are opened at the end of run the remnant left in cupola drops down.

uch cupolas are there- e known as "dropbottom" olas. An annular cham- called the wind belt, ircles the lower part of ola. The air for combustion, normally blown by airblowers, enters the wind belt and then passes inside the cupola through a series of cast iron tuyers placed at regular intervals around the periphery.

At one side of the shell there is an opening through which fire is lighted while starting the cupola for the melting operation. A tap-hole is formed in the same opening. A spout projects out from the opening leading the molten metal out of the cupola into the ladles. A slag-hole is provided on the opposite side of the cupola. The lower surface of the cupola lining is kept in a slightly inclined position, the tap-hole being located towards the lower side of the inclination. The slag-hole which is two-three inches lower than the tuyers is located towards the upper part of the inclined surface. This helps easy removal of floating slag which is lighter than the molten metal. In order to prevent the slag from solidifying because of cooling action of the air blast through the tuyers, the slag-hole is located midway between the tuyers. Cupolas are lined up to the charging door with two thicknesses of refractory material. The charging door is located in the upper region of the shell.

The operation of cupola may be divided into three parts: (i) cleaning, (ii) lighting, and (iii) melting.

*Cleaning*: After every operation of the cupola, it must be cleaned and repaired. Burned parts are repaired by damping mixture which is prepared by mixing 2 parts of ganister to 1 part of fireclay. The cupola lining is washed with fireclay slurry and then the damping mixture is rammed whenever necessary.

*Lighting*: The cupola is filled with wood up to 10"-12" above the tuyers. Then about half of the bed charge is filled with coke on top of the wood. The other half of the bed charge is charged after the first half is ignited. When the bed charge is well ignited, first charge of pig iron is put in. Alternate layers of coke, each about 6" deep, are put with layers of iron.

*Melting*: The iron should be charged according to its size and melting point. Pig iron melts slowly due to large size of pigs. Steel melts slowly due to higher melting point and light scrap melts easily. Heavy scrap requires time according to its size and thickness. The tap-hole made up of fireclay is kept open, with blast turned on, until the iron begins to melt. The tap-hole is then bolted and closed up with moulding sand with clay wash.

The cupola can be tapped after 10 minutes from the start and every 5-6 minutes afterwards.

*Fluxing*: When 'heats' have to be run longer than one hour, flux has to be added to get rid of the ash from the coke and the sand which may be sticking to the pig and the scrap. About 30-40 kg of limestone have to be added per ton of metal.

*Moulding practice*: The moulds into which iron is poured after melting to obtain casting of definite outlines are either of sand or iron. The process in which the latter is used has limited application and is known as "chilled casting". Sand holds a supreme position over other materials for making moulds because of its properties like refractoriness, plasticity, porosity, firmness. Also it is abundantly available in nature.

The requirements of a perfect mould are, it should withstand high temperature without damages to the surfaces of contact. The sand must be adhesive or strong enough to remain intact after being rammed about the pattern and after its removal and setting of cores.

The mould should have enough porosity to allow the liberated gases and steam to pass through.

*Type of sands*: The sands differ widely in their physical properties. While some are loose, open and free, some are clayey, close and dense. In practice advantage is taken of both the properties by mixing both types of sand. Also sand must have good grain structure and sufficient clay to bind properly without closing up the spaces when ramming. The property of sand of allowing gases, air and steam to pass through the mould is called permeability.

Sand is considered 'green' when the mixture is used in its natural condition, that is damp air mixed with just sufficient water to make it coherent. The mould is almost ready for casting after the pattern has been removed from the mould. However, this type of sand is considered weak in contrast to the mixtures which are comparatively stronger, that is having more coherence.

Ordinary green sand mixtures cannot be dried and yet retain its coherence. Mixtures of close sand are made with various binding agents, mainly sugarcane molasses. The moulds are heated with a stove at 200°C to 300°C. Such moulds are hard and firm.

Loam is a strong mixture of clayey and open sands ground together. The close texture of the loam is not vented as is usual with green and dry sand moulds with vent wire, but certain combustible substances are mixed and ground up with sand and these become carbonised during drying. The material usually employed is manure mixed with large portion of half digested hay.

*Floor sand*: The sand which comes in contact with the molten metal gets baked. The baked sand before being allowed to mix with the floor is cleaned to remove particles of metal, lifters, nails, etc. For large bulk castings which are cast in sand beds on the floor, for only portions which come in contact with the hot molten metal about one inch thickness, use is made of fresh sand called facing sand.

The sand which is rammed around the pattern and which comes in contact with molten metal is termed as facing sand.

*Conditioning of moulding sands*: The moulding sand as obtained in a foundry has to be conditioned before being used in moulds. Conditioning may consist of one or more steps including simple mixing of the sand with other ingredients, mulling of the ingredients (mulling is a form of mixing achieved by rolling, grinding, rubbing or stirring action).

Often different types of mechanical mixers are used. These mixers have rotating wheels rubbing the sand mixture inside a pan.

*Moulding methods*: The oldest and slowest method of making mould is by hand ramming. It is usually necessary for loose pattern moulding, and it is also used for mounted patterns when sample castings are produced. In India, most of the sma foundries adopt this metho since it requires minimu capital investment for moul ing practice. Modern foun ries use different types moulding machines. The ma types are Jolt-type and Jo squeeze type.

Jolt-type moulding machin operate with the patte mounted on a pattern pla which in turn are fastened the machine table. The tab is fastened to the top of t operating pneumatic pist The sand is compacted by i own weight, it is, therefor harder near the pattern pla and a tall pattern thus c have appreciable decrease mould hardness verticall Ramming of the sand on t pattern by jolting eliminat much of the manual rammi labour. It also increases pr duction rate.

Jolt squeeze mouldi machine uses same patte equipment as jolt, but aft jolting operation sand squeezed by air pressure, pr ducing a uniform and hard rammed moulds.

Sand slingers are mouldi machines that deliver t sand into the mould by vel city from rotating impell Sand slingers are portable usually travelling on rai They are most often used f ramming medium size large moulds.

*Cleaning of castings*: T cleaning of castings general refers to the operations i volved in removal of sand a scale, gates and risers a fins, wires and other met not a part of the casting. R moval of gates and risers usually the first operati These are removed by ha using chisel and hamme But the method is limited smaller castings. Abrasi cut-off wheels are used f larger and harder castin Band sawing is used both f ferrous and non-ferrous ca ings. Surface cleaning ope tions may employ differe methods such as rubbing, sa and shot-blasting, wire brus ing, tumbling and also ab sive wheels.

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# The furnace industry

—A FEATURE

## 3right prospects ahead

**y J. V. Patel**

THE furnace industry in India is still in its in- ncy. It was just about 15 ars ago that the yearly oduction of furnaces in r country was worth as low Rs 4 lakhs to Rs 5 lakhs t since then the rate of ogress of this industry has en steady and considerable.

The yearly production of e furnace industry in the t 15 years has gone from Rs 4 to Rs 5 lakhs a ar to about Rs 70 millions t year. An industry with h rapid progress is bound face innumerable problems. ese problems are more ere in the furnace indus- , since furnaces are basic- y tailor-made to suit the uirements of individual rs. It is not like machine ls, where the production is quantity, thereby making product develop much ier than the furnace. The ic aspects contributing to success of furnaces are de- n, operation and commis- ning as well as raw terials.

The furnace technology is hly complex and is prone rapid changes. One finds in developed countries con- erable progress in develop- nt of design and techno- y in this line. It is, there- e, essential that technical ow-how of a right quality is ported from developed countries in order to establish the manufacture of modern furnaces in India. This flow of imported technology must continue for a long period of time till our technical personnel are properly groomed and experienced in utilising imported technology to the fullest extent. Encouragement through institutions for research and development and through the manufacturers of furnaces to take up the work of improvisation and in inventing the furnace designs to maintain certain comparable standards which one finds in advanced countries, should be given in form of material benefits.

However, the import of technical know-how has become rather difficult with the existing stringent rules laid down by the Government, as well as due to unsatisfactory financial situation prevailing in the country especially in the engineering industry.

Continuity in research and development of furnace technology is essential. There should be sufficient educational facilities for furnace technology. Therefore, furnace technology should be included in the curriculum of technical institutes. This will make available sufficient number of qualified furnace engineers as well as provide further research facilities in such institutions. If this facility is created in technical institutes, the furnace manufacturers will not be put to difficulty in finding the right calibre of technicians for the manufacture of furnaces.

Due to the very nature of furnace technology, it is essential that there should be close collaboration and contact between the users and manufacturers of furnaces. This would enable proper feed-back from the users with regard to actual operation of the furnaces so that necessary improvements and improvisation in design can be easily carried out.

One difficult problem faced by the industry is the shortage of raw materials of good quality. Materials such as special quality refractories, instruments, certain electrical, heat resisting castings and steel etc have to be imported and therefore cannot be made available in reasonable time due to delay of issue of import licence or endorsement of licences and various other Government formalities. The essential raw materials required for furnace manufactue therefore must be allowed to be imported, without any restriction if we expect to get reasonably good performance and life of the furnaces.

The basic materials required for furnace building such as steel, castings, refractories and instruments which are procurable locally, are not, however, available in proper quality and quantity at the right time. The steel quotas available are not sufficient and their supply is not quick enough and the furnace builders, usually, have to buy from the open market and pay fabulous price.

The refractory industry hardly pays any heed to the requirement of the furnace industry. The types of refractories manufactured are mainly to cater to the requirement of the steel plants. The prices

**Production of furnaces**

(Rs crores)

| Year | Production |
|---|---|
| 1964 .. .. .. | 1.86 |
| 1965 .. .. .. | 1.92 |
| 1966 .. .. .. | 4.63 |
| 1967 .. .. .. | 4.00 |
| 1968 .. .. .. | 3.10 |
| 1969 .. .. .. | 3.24 |
| 1970 .. .. .. | 2.67 |
| 1971 .. .. .. | 5.47 |
| Annual compound rate of growth between 1964 and 1971 | 16.7 |

SOURCES :

1. For the years 1964 to 1968, Central Statistical Organisation, Department of Statistics, *Monthly Statistics of the Production of Selected Industries of India, for November and December 1968, Vol. XX, Nos. 11 and 12, and January and February 1969, Vol. XXI, Nos. 1 and 2, Calcutta.*
2. For the years 1969 and 1971, Directorate General of Technical Development, *Annual Report 1970-71 and 1971-72,* New Delhi.

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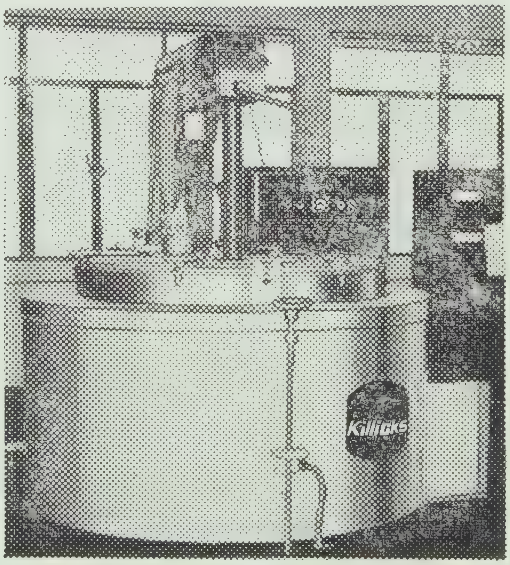

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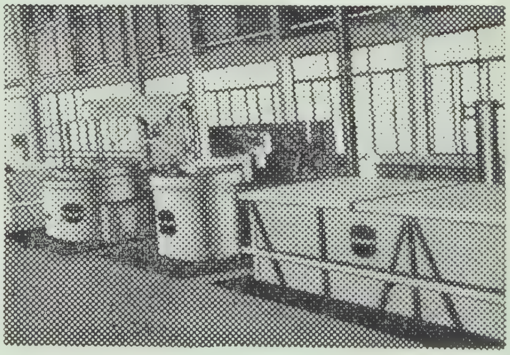

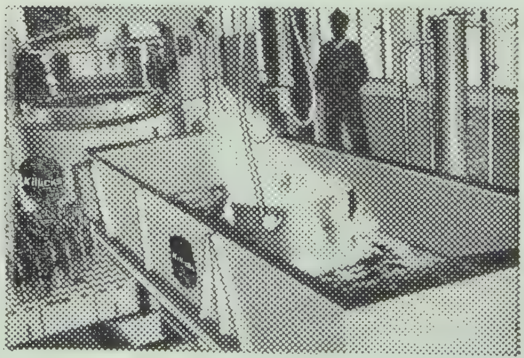

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refractories have increased
leaps and bounds in the
st five years. The deliveries
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rtain. The deteriorating
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curacy also worry the fur-
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oreover, the deliveries are
ry uncertain and there is
most total absence of after-
es service facilities.

These problems have put
e furnace builder in an un-
viable situation, where he
s to take the brunt of
stomer-punishment for de-
ed deliveries and unsatis-
ctory performance even if
design is perfect.

n spite of problems, the
spects of the industry
ems very bright. Looking
the expansion programme
the existing steel plants
our planned programme
setting up mini-steel
nts immediately at Kan-
, Vizag, Salem and Hospet,
steel production is going
ncrease multifold. The ex-
sion of furnace industry is
ectly linked with the ex-
sion of the engineering
ustry, which in turn is
endent on the production
steel.

or steel plants alone, the
uirement of primary fur-
es from 1973 to 1980 is ex-
ted to be of Rs 79 crores.
demand for secondary
naces will increase from
7 crores now to about
15 crores per year by 1979.
is certain that once the
po of expansion in the
ineering industry is main-
ed with the increase in
duction of steel, the re-
rement of secondary fur-
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n though the requirement
primary furnace may fall
r on. Thus, the overall pic-
for the furnace industry
ery encouraging and it is
ed that with the joint
rts of furnace builders, the
ernment, suppliers of raw
erials and the users,
industry will be able
surmount the present
culties. ☐

# Import of special steels

**By H. T. Makhijani**

THE manufacture of furnaces in India commenced in the late 50's, with the production of small muffle type furnaces for general purpose heat treatment. By 1964-65 the annual production had reached approximately Rs 2 crores and a number of companies, based mainly in Bombay and Calcutta, started design, manufacture and supply of more sophisticated furnaces with foreign collaboration. At that stage a few of the more progressive companies started their own design and development department to ensure progressively less dependence on the design of the foreign collaborators. The current production is of the order of Rs 7.5 crores. This is expected to increase to over Rs 20 crores by 1980.

The furnaces may be classified in two major groups: (*a*) Primary furnaces—These are furnaces required by steel plants; and (*b*) Secondary furnaces—These are furnaces required by metal-working industry, consumer industries, etc.

The production of the primary furnaces in the 60's increased mainly due to expansion of the Rourkela steel plant, Durgapur steel plant as well as setting up of an alloy steel plant at Durgapur and a few other alloy steel plants of smaller sizes.

In the latter part of the 60's, the only new steel plant under construction was the one at Bokaro. The entire engineering, detailed drawings as well as the special components for the primary furnaces of Bokaro were made available by the USSR. Accordingly, steel structures, refractories and other components were purchased by the Bokaro authorities directly from the manufacturers and hence the setting up of the Bokaro steel plant did not provide any appreciable work for the Indian furnace industry.

Faced with this situation, the Indian furnace industry switched over from the manufacture of primary furnaces to secondary furnaces in the latter part of 60's. Since then the setting up of a large number of mini steel plants has provided sufficient work for those manufacturing electrical melting furnaces. The rest of the manufacturers have concentrated on supplying secondary furnaces, that is, heat treatment furnaces for various industries.

Based on the steel programme finalised by the Government of India and indicated by the Ministry of Steel, it is expected that the installed steel making capacity by 1978-79 will amount to 19 million ingot tons.

The likely demand pattern of primary furnaces required by steel plants is given in the accompanying table. From this it will be noted that during the Fifth Five Year Plan commencing from March, 1973 the average annual demand for primary furnaces is Rs 10 crores.

It is estimated that the value of the secondary furnaces required by the metal-working industry and consumer product industries

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*Mr Makhijani is Chief Technical Executive of Westerwork Engineers Pvt Ltd, Bombay.*

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ould be of the same order s that of the primary furaces required by steel lants.

Accordingly, the total capaity of the furnace industry hould, therefore, increase to s 20 crores by 1977-78. Durg the 80's it is expected at every year additional eel making capacity of 2 illion tons would have to e added to cater to the eveloping economy of the ountry. It is estimated that very 2 million tons steel ants will require approxiately Rs 16 crores worth of rnaces.

The manufacture of furaces involves use of mild eel, refractories, heat resistg steel, combustion system, ntrol systems, mechanical uipment and electricals. As r as the availability of the w materials and components concerned the problems of e industry are no different om those faced by the other dustries. However, of partilar concern to the furnace dustry is the availability of sign engineers as well as oject engineers. The traing of design engineers and oject engineers is a longrm process as minimum of to 10 years' experience in e industry is essential.

Recruitment of new engiers to be trained as design gineers on a long-term basis, however, can only be done by the industry provided it is assured of steady business in time to come.

The Government of India, accordingly must ensure greater caution in import of furnaces and their drawings for the steel and metallurgical industries. It is understood that the public sector metallurgical plants including Bokaro steel plant, Bhilai steel plant, Bharat Aluminium Company Limited Korba, etc are finalising the purchase of complete detailed drawings for the furnaces required by these plants for their expansion programmes.

Purchase of detailed drawings of the furnace plants and subsequent procurement of various components directly from various suppliers completely dissipates the know-how that would be localised in the furnace industry if the entire furnace is built and supplied by a furnace company. Therefore, procurement of furnaces from the Indian furnace industry, even if it involves payment of certain engineering fees to foreign collaborators would, in the long run, help the industry in consolidating know-how and training of the design/project engineers.

The foreign collaborators for a new steel plant or metallurgical plant may, therefore, give only the main parameters for the furnaces leaving the entire detailed designing and drawings work to the Indian furnace industry. This would provide not only steady work-load to the furnace industry but also help in the employment of a large number of unemployed engineering graduates.

In this context reference may be made to the experience gained in Japan, who after the war did buy basic know-how in "wholesale". However, because the detailed engineering and drawings and manufacture were taken up by the local industry, in course of time, the local industry could not only provide steady employment but also afford to spend more money on Research and Development.

Besides the shortage of trained man-power, the main problem facing the furnace industry is import of special grades of raw materials and components. Depending upon the type of the furnace the import content may vary from 2 per cent to as much as 30 per cent. The canalising of the import of heat resisting steel required by the furnace industry in wide varieties but in small quantities has become one of the restraining factors on development of the industry. In typical cases, as much as 12/16 months are required for procurement of special grades of steel thus holding up commissioning of plants costing several millions of rupees. Direct import of such special steels by the industry would greatly help the furnace manufacturer.

Due to the bulkiness of the product and adverse freight rates there is very limited scope for export of furnaces. The future for export, however, could be brighter if furnaces are exported as part of turn-key projects for setting up steel plants/heat treatment plants, etc.

The furnace industry plays a vital role in setting up of steel plants, ordnance factories, as also in the air-craft industry, automobile industry and other such priority industries.

From strategic point of view it is, therefore, necessary that the industry is given the necessary encouragement to meet fully the annual requirement of furnaces exceeding Rs 20 crores by 1980.

Dialogue has already been started between the industry and the Government through the furnace panel, set up by the Government of India. With proper encouragement, it is hoped that the Indian furnace industry will play a still greater role in the industrialisation of the country.

**Likely demand pattern of primary furnaces (excluding melting): 1973-1981**

(Million rupees)

| | 73-74 | 74-75 | 75-76 | 76-77 | 77-78 | 78-79 | 79-80 | 80-81 | Plantwise Total |
|---|---|---|---|---|---|---|---|---|---|
| *Expansion* | | | | | | | | | |
| 1. ASP Durgapur | 4 | 17 | 18.5 | — | — | — | — | — | 39.5 |
| 2. CARGO, Rourkela | 5 | 20 | 25.0 | — | — | — | — | — | 50.0 |
| 3. Bhilai | 25 | 70 | 51.0 | — | — | — | — | — | 146.0 |
| 4. Bokharo | 23 | 67 | 45.0 | — | — | — | — | — | 135.0 |
| | 57 | 174 | 139.5 | — | — | — | — | — | 370.5 |
| *New Plants* | | | | | | | | | |
| 1. Kanpur | 2.0 | 5.5 | — | — | — | — | — | — | 7.5 |
| 2. Salem | — | — | 7.0 | 21 | 8.6 | — | — | — | 36.6 |
| 3. Hospet | — | — | — | 19 | 40.0 | 70 | 25 | — | 154.0 |
| 4. Vizag | — | — | — | — | 16.0 | 35 | 65 | 29.0 | 145.0 |
| | 2.0 | 5.5 | 7.0 | 40 | 64.6 | 105 | 90 | 29.0 | 345.1 |
| *al of a & b* | 59.0 | 179.5 | 146.5 | 40 | 64.6 | 105 | 90 | 29.0 | 713.6 |

# R & D in furnaces

**By a special correspondent**

THE ratio of energy consumption to gross national product has been increasing in the recent past. This is a disturbing trend indicative of the fact that the national specific fuel consumption average has been increasing. In other words, the efficiency of fuel utilisation has been declining in spite of progress in the industrial field. It has been indicated by several experts that the fuel utilisation in the industrial sector needs to be improved. It should be possible to save on an average 15 to 20 per cent of fuel. Savings to such an extent in commercial fuels on a national scale would bring enormous benefits to the nation.

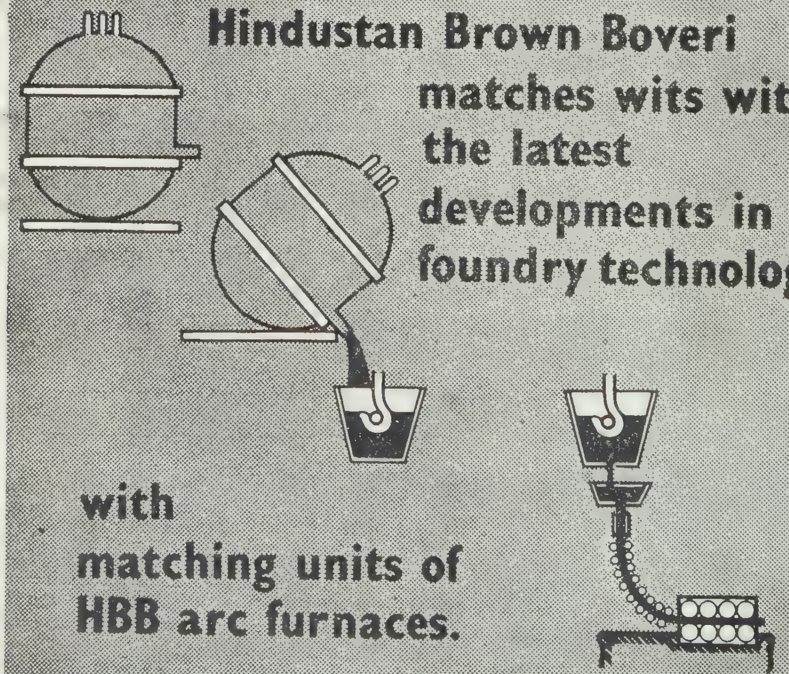
It was in this context that the National Committee on Science and Technology constituted an expert group to recommend research and development efforts that should be initiated to improve efficiency of fuel utilisation and reduce atmospheric pollution in industrial sector furnaces and boilers. The 12-member expert group is headed by Mr P. R. Srinivasan of the National Productivity Council.

Among the items examined by the expert group are: furnace design aspects, waste heat recovery, total energy concept, atmospheric pollution, instrumentation and training of furnace and boiler operators.

The expert group has suggested that a suitable design should be evolved for the fuel burning system for liquid fuels as most of the existing burners in industrial furnaces and boilers are not found to be efficient over wide range of load variations and also lead to atmospheric pollution. It has recommended development of a special type of burner capable of burning all fractions of petroleum products and capable of giving variable flame shape to suit combustion equipment. In addition, low excess burners capable of burning petroleum fuels with 0.5 to 1 per cent excess air must also be developed because they could substantially reduce atmospheric pollution. This development work is likely to be undertaken by the Indian Institute of Petroleum, Dehradun.

The expert group thi that installation of wa heat recovery systems recuperators and regen tors for industrial furna and installation of waste h boilers wherever feas should be made obligat because the amount of av able wastage of heat thro the chimney to the mosphere is enormous much of it could be recove easily resulting in fuel sav of 10 to 30 per cent.

Design of simple low- automation devices which easy to maintain are rec mended for development the sophisticated autom controls and instruments not suit the propensity untrained labour, and soon rendered out of or Such simple devices h been developed in Japan the Netherlands to cater their indigenous conditi and similar devices should developed in this cour also.



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*This is the thirteenth feature on khadi and village industries*

# Processing of cereals and pulses industry

### A COMMERCE FEATURE

AMONG the cottage industries for processing agricultural produce, handpounding of paddy and handgrinding of pulses are important in India, because they provide ample off-season opportunity of work to agricultural labour. According to the census data, at the beginning of this century over half a million rural labour found employment in these two traditional industries. These processed practically the entire output of cereals and pulses. Around the same time, a few hullers were introduced for the first time in India. In fact these machines heralded the age of mechanisation not only in paddy processing but in almost the entire sector of agricultural processing industries. These hullers were followed by shellers in 1920 and later by sheller-huller combinations, expellers and rotaries for oil pressing, sugar mills, and so on.

This process of mechanisation in almost every sphere of agricultural processing was quite rapid in the fifty years that followed. In rice-milling, particularly, the progress was fast and widespread. Thus, in 1970 a total number of 66,000 mills of various types were reported to be in operation. Of these, a preponderant majority were hullers accounting for 58,000 and among others were 2,800 shellers and 5,200 huller-sheller combined mills.

As a result, the supply of paddy, despite the 2 per cent annual growth in the decade and a half, to the handpounding units was reduced very sharply to about 40 per cent of the total output, 60 per cent being drawn by the mills. Of this 60 per cent, almost two-thirds was processed by the hullers alone, the sheller sector accounting for only a third of the supplies available to the milling sector. Another more serious consequence of this development, particularly of hullers, was the adverse impact on employment in the handpounding sector which declined from about 10 lakhs in 1910 to less than 4 lakh persons in 1961. Though the census data for 1971 are not still available, the possibilities are that this employment would have gone down further to about 2 to 3 lakhs in the 60's. Thus, as against a total loss of employment to about 7 lakh agricultural labour in handpounding, the mills employed only 90,000 persons in 1970.

Apart from the resultant unemployment, the loss of foodgrains in the hullers, which are admittedly inefficient instruments, is also considerable. It is well known that hullers give, on an average, a yield of about 4 to 6 per cent less than that obtained in handpounding. Further, in hullers the husk and the bran get mixed up. This renders the bran unfit for cattle consumption. Moreover, even as a source of edible rice-bran oil, the bran produced in the hullers is of poor quality. Thus, at a time when we badly need more grains and edible oils, we find the uneconomic rice milling system of hullers dominating the scene.

There is also the third aspect which is no less important. It is well known that the handpounded rice has higher nutritional value than the milled rice. Rice being the staple diet for about 75 per cent of Indian population, particularly the poorer sections, it is obvious that the supply of nutritious rice should be increased so that it is available to these poor consumers. However, many of the nutrients contained in the grain are lost when the paddy is polished in the hullers and rice mills. The nutritional contents, according to experts, of the handpounded and milled rice are given in Table 1.

**Table 1: Nutritional value of rice**

(Per 100 gm

| | Raw rice | | Parboiled rice | |
|---|---|---|---|---|
| | Hand-pounded | Milled | Hand-pounded | Milled |
| Moisture (gm) | 9.6 | 9.7 | 12.6 | 13.3 |
| Protein (gm) | 7.3 | 6.9 | 8.5 | 6.4 |
| Fat (gm) | 1.2 | 0.5 | 0.6 | 0.4 |
| Carbohydrates (gm) | 80.1 | 82.1 | 77.4 | 49.1 |
| Crude fivre (gm) | 0.7 | 0.2 | — | — |
| Mineral matter (gm) | 1.1 | 0.8 | 0.9 | 0.8 |
| Calcium (mg) | 13 | 10 | 10 | 10 |
| Phosphorus (mg) | 182 | 87 | 280 | 150 |
| Iron (mg) | 2.8 | 2.2 | 2.8 | 2.2 |
| Thamine (mg) | 0.21 | 0.11 | 0.27 | 0.21 |
| Riboflavin (mg) | 0.16 | 0.06 | 0.12 | 0.09 |
| Nicotinic acid (mg) | 2.5 | 1.0 | 4.0 | 3.8 |

In recognition of all this, the Government of India appointed in 1954 the Rice Milling Enquiry Committee to study the different systems of processing of paddy and recommend measures for avoiding loss of resources and for increasing the output in processing. This Committee, among other things, recommended (i) regulating the growth of units, (ii) restricting polish to 3 per cent and (iii) encouraging the scientific and organised development of handpounding under a common production programme for the two sectors of paddy processing. Accepting the committee's recommendations, the Government of India enacted the Rice Milling Industry Regulation Act in 1958 and empowered the State Governments to regulate the growth of rice mills through licensing and restricting the polish to 3 per cent. Through subsequent amendments of the Act and the rules framed thereunder in 1967, while the statutory level of polish was increased to 5 per cent, the provisions as relating to the establishment and operation of hullers were made more stringent. Despite all this, the number of hullers increased unabated on account of inadequate superintendence and vigilance exercised by the district authorities who neither had adequate staff nor expertise necessary to execute the task expected of them.

When the Food Corporation of India came into the picture, it also took up for examination the question of economic processing of paddy. It appointed a committee which, it is understood, recommended a complete ban on the establishment of hullers and the scrapping of the existing ones in a phased manner. It is also credited with the suggestion for organising a large number of decentralised paddy dehusking centres in villages growing paddy. According to the committee, these centres would serve the twin objectives of employment and prevention of loss of grains in processing paddy in the hullers to the
extent of Rs 35 crores annually. At t
same time, it would effect some savi
in the cost of transportation of pad
to the mills for further processing.

Simultaneously, a committee a
pointed by the National Co-operati
Development Corporation and a Fo
Foundation team also recommended t
establishment of modern rice mills
order to raise the recovery from t
average level of 56 to 65 per cent th
obtaining in the traditional rice milli
system to about 68 to 72 per ce
Setting up of solvent extraction pla
for extracting bran oil from rice br
which was hitherto either fed to cat
or left to go waste was also reco
mended by some experts. This, it w
estimated, would help recover abo
Rs 50 crores worth of oil from the br
hitherto unutilised. A pilot programm
for setting up of 24 modern rice mi
in co-operative sector societies was,
cordingly, initiated by the Governme
in 1965. Under this programme, mi
were set up in selected rice-growi
districts like Thanjavoor in Tamil Na
East Godavari in Andhra Prade
Raipur-Bilaspur in Madhya Prade
Mandya in Mysore and in some oth
places. While the performance of the
mills showed varying degrees
efficiency in terms of recovery, th
multiplication was beset with ma
problems involving ecology, cost of
vestment and management and ca
city of the growers to develop pro
attitude and adopt the new technolo
Ways are yet to be found to get o
some of these problems and, therefo
not much breakthrough has be

eved so far in the much-publicised ernisation programme for rice mills.

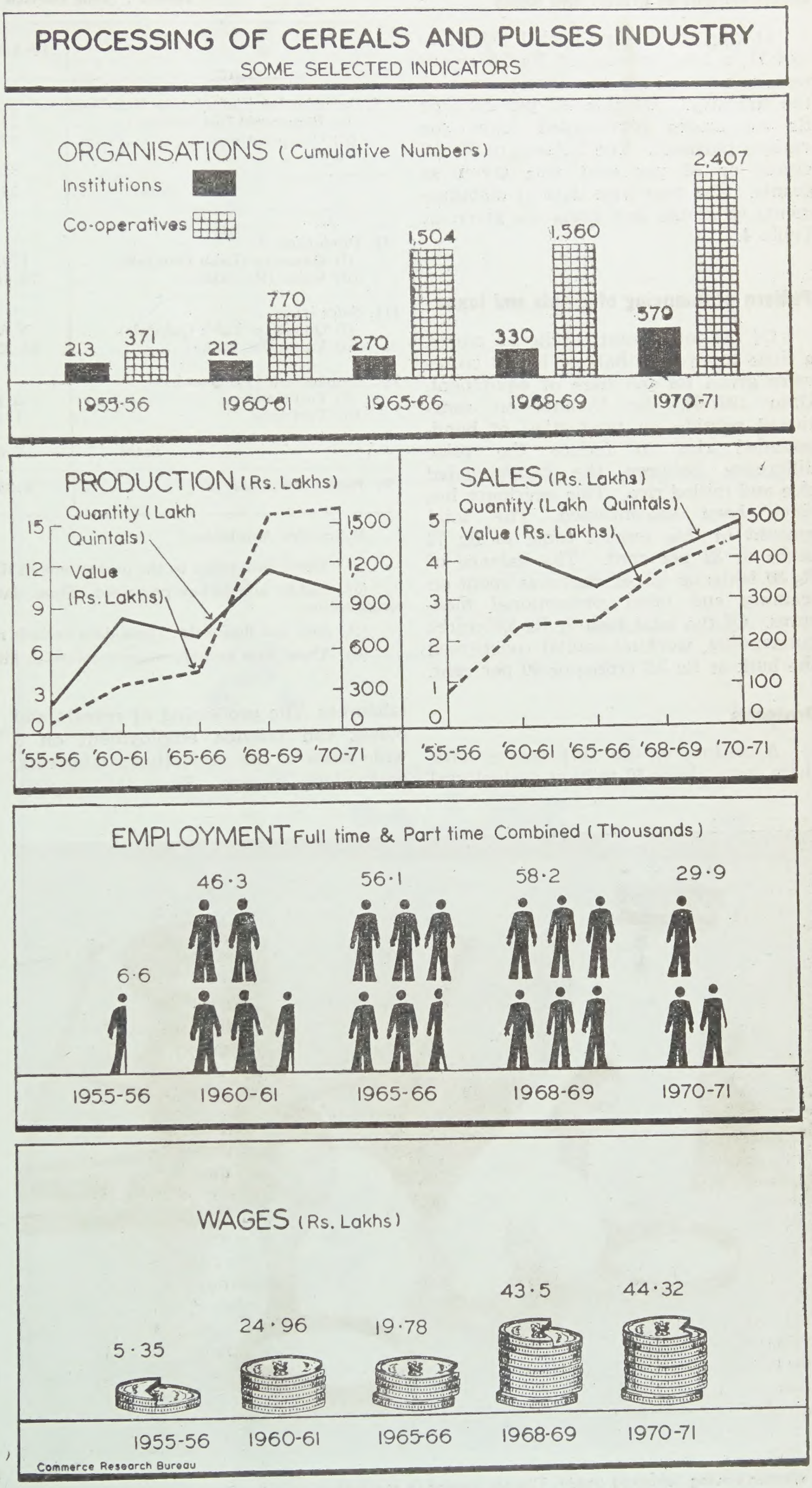
### e of Khadi and Village Industries mmission

In regard to the handpounding of dy and processing of pulses industry, policy of the Government was to note their development on modern viable lines. For this, the Govern- t gave financial and technical stance through the Khadi and Vil- e Industries Commission. Consider- e progress has been recorded since in the organisation and develop- t of these activities as can be seen n the data set out in Table 2.

### hnological improvements

During the past decade and half, Commission has successfully design- and developed a number of im- ved tools, both hand and power rated. Arrangements have also been le for their manufacture and distri- on to the artisans and their organisa- s. Bonded *chakki* Qualitex dehusker, HP Koolex cone-polisher and 1.5 HP n making machine are three of the ortant equipment introduced in the . The cost of these equipment e from about Rs 52 for bonded *ki* to Rs 750 for Qualitex dehusker Rs 1,500 to Rs 2,500 for other hines. All these have helped the kers to increase their daily income less than Re 1 in 1955 to Rs 3-5 in Table 3 highlights the progress in distribution of these equipment.

n 1953-54, production of processed als and pulses under the aegis of Commission was about Rs 54 lakhs. 968-69, the production reached the mum level of 12 quintals valued at 6 crores. Sales of rice and flour unted to 4 lakh quintals (Rs 3.8 s). It may be noted that a large of production consisted of produc- for self-consumption and therefore to general consumers were of a order. In recent years, the pro- on has declined because procure- of paddy under a levy system, ctions on the inter-State movement ddy and rice and competition from millers and hullers restricted the of handpounding. The craze for y polished rice bereft of all its tional elements, coupled with lack ropaganda about the nutritional of handpounded rice and its use, the factors responsible for the de- in the output of handpounded rice. 5 presents the details for the year- production, sales and employment g the 18-year period from 1953-54 70-71.



## Disbursement of grants and loans

During the 18-year period 1953-54 to 1970-71, a total amount of Rs 5.8 crores were sanctioned for the development of the industry. Of this, 62 per cent or Rs 3.6 crores represented loans for various purposes. The balance of Rs 2.2 crores or 38 per cent was given as grants. The year-wise data of disbursements of grants and loans are given in Table 4.

## Pattern of financing of grants and loans

Of the total grants of Rs 2.2 crores, a little more than half or Rs 1.2 crores were given for purchase of equipment. Upto 1967-68, the Commission sanctioned subsidy on production of handpounded rice to reduce the price difference between the handpounded rice and milled rice. This assistance has since been discontinued. The total amount in this respect came to Rs 72 lakhs or 32 per cent. The balance of Rs 30 lakhs or 16 per cent was spent on training and other promotional measures. Of the total loan of Rs 3.6 crores outstanding, working capital constituted the bulk at Rs 3.2 crores or 90 per cent.

Table 2 : Some selected indicators of progress (*a*)

| | 1955-56 | 1960-61 | 1965-66 | 1968-69 | 1970-71 |
|---|---|---|---|---|---|
| I. *Organisation* (Cumulative Numbers) | | | | | |
| (i) Registered Institutions .. | 213 | 212 | 270 | 330 | 579 |
| (ii) Co-operatives .. .. .. | 371 | 770 | 1,504 | 1,560 | 2,407 |
| Total .. | 584 | 982 | 1,774 | 1,890 | 2,986 |
| II. *Production* (*b*) | | | | | |
| (i) Quantity (Lakh Quintals) .. | 1.91 | 8.49 | 6.19 | 11.79 | 9.90 |
| (ii) Value (Rs. lakhs) .. .. | 76.40 | 356.50 | 420.44 | 1,572.65 | 1,615.63 |
| III. *Sales* (*c*) | | | | | |
| (i) Quantity (Lakh Quintals) .. | N.A. | 4.11 | 3.30 | 4.08 | 4.90 |
| (ii) Value (Rs. lakhs) .. .. | 83.82 | 241.72 | 247.10 | 383.43 | 443.12 |
| IV. *Employment* (*Thousands*) | | | | | |
| (i) Full time .. .. .. | 5.1 | 17.7 | 10.2 | 10.2 | 10.3 |
| (ii) Part time .. .. .. | 1.5 | 25.6 | 45.9 | 48.0 | 19.6 |
| Total .. | 6.6 | 46.3 | 56.1 | 58.2 | 29.9 |
| V. *Wages* (*Rs. lakhs*) (*d*) .. .. | 5.35 | 24.96 | 19.78 | 43.5 | 44.32 |

N.A.=Not Available.

(*a*) These data relate to the programme of Khadi and Village Industries Commission only.

(*b*) Paddy and pulses processed. These data include paddy and pulses processed for sel consumption.

(*c*) Rice and flour sold. These data exclude rice and flour retained for self-consumption

(*d*) These data exclude wages received in kind.

## Prospects

According to the 1971 census data, there were about 47 million agricultural labourers. The processing of cereals and pulses can provide employment on a wide scale to the agricultural labourers, particularly women. Since this employment is generally in the off season,
will be a good source of supplementar
income. During the last 15 years, th
output of rice has risen at an annu
compound rate of 2 per cent. This shou
have provided additional employme
to agricultural labour in the processi
of paddy and other allied activitie
But this has not been so. There is al
the immediate need to diversify th
processing of cereals and pulses indu
try on more viable lines of productio
In addition to dehusking and polishi
paddy, other lines of production such
making *dhan atta**, *papad, waria* bre
and buns and other food products shou
be encouraged. The technologically lo
base of the industry needs to be u
graded. The Commission has develope
suitable techniques and implements f
this. These new innovations should
quickly popularised through practic
programmes particularly in rice growi
areas and backward areas keeping
view the local conditions of ecolog
milling system, availability of labo
and their skill and disposition.

The suggestion of the committee
the Food Corporation of India abo

Women sieving dehusked paddy. The equipment in the background is a Qualitex paddy dehusker

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**Dhan atta* is whole rice flour or pad
flour ground fine 80 to 100 mesh. *Bal a*
and *Jan atta* are its other variants.

**Table 3 : Improved tools distributed by Khadi and Village Industries Commission**

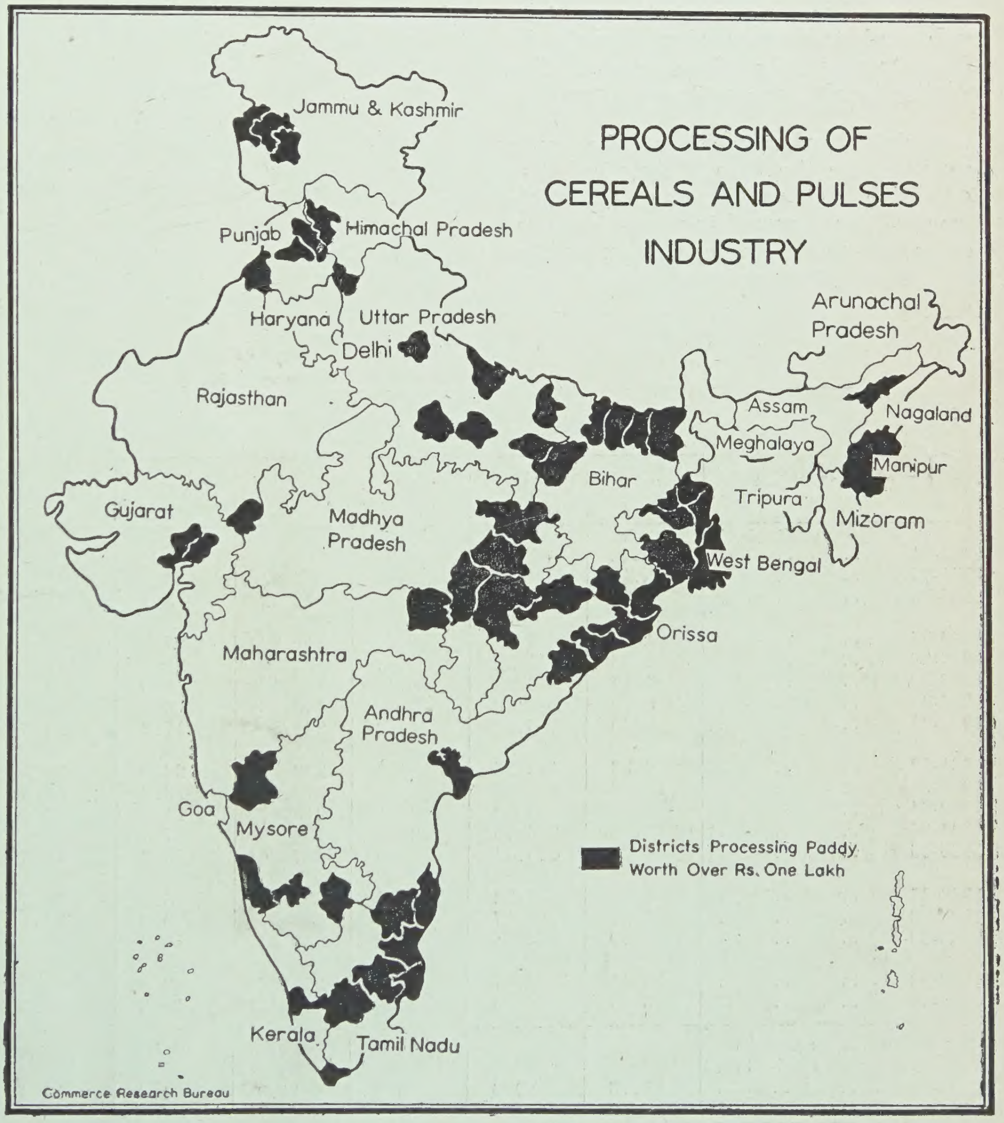
(Planwise Totals)

| Industry/Equipment | First Plan (1953-54) | Second Plan (1956-61) | Third Plan (1961-66) | Annual Plans (1966-69) | Fourth Plan (1969-71) |
|---|---|---|---|---|---|
| 1. *Atta chakki* .. .. | 1,495 | 19,492 | 19,735 | 27,431 | 13,402 |
| 2. Paddy *chakki* .. .. | 1,231 | 5,333 | 10,408 | 6,816 | 2,556 |
| 3. *Dal chakki* .. .. | .. | .. | .. | 25 | 115 |
| 4. Winnowing fan .. | 158 | 436 | 299 | 632 | 309 |
| 5. *Dhenki* .. .. .. | 196 | 732 | 263 | 460 | 932 |
| 6. Ball-bearing set .. | 34,661 | 36,532 | 1,156 | 7,829 | 1,474 |
| 7. Pestle and mortar .. | .. | .. | .. | 182 | 334 |
| 8. Qualitex paddy dehuskers .. .. .. | .. | .. | 117 | 286 | 47 |
| 9. Gear shellers .. .. | .. | .. | .. | 129 | 87 |
| 10. Power paddy shellers, polishers etc. .. .. | .. | .. | .. | 12 | 81 |

**able 4 : Disbursements of grants and loans by Khadi and Village Industries Commission**

(Rs lakhs)

| Year | Grants (additional) | Loans outstanding (Cumulative) | Total |
|---|---|---|---|
| 3-54 .. | 1.64 | | 1.64 |
| 4-55 .. | 1.50 | 2.54 | 4.04 |
| 5-56 .. | 4.51 | 13.26 | 17.77 |
| 6-57 .. | 8.57 | 22.10 | 30.67 |
| 7-58 .. | 9.17 | 38.78 | 47.95 |
| 8-59 .. | 11.88 | 83.02 | 94.90 |
| 9-60 .. | 6.97 | 146.39 | 153.36 |
| 0-61 .. | 14.95 | 195.36 | 210.31 |
| 1-62 .. | 24.78 | 254.81 | 279.59 |
| 2-63 .. | 21.08 | 237.14 | 258.22 |
| 3-64 .. | 28.52 | 276.68 | 305.20 |
| 4-65 .. | 9.21 | 256.43 | 265.64 |
| 5-66 .. | 21.70 | 272.06 | 293.76 |
| 6-67 .. | 18.50 | 314.41 | 332.91 |
| 7-68 .. | 13.58 | 329.47 | 343.05 |
| 8-69 .. | 11.47 | 351.38 | 362.85 |
| 9-70 .. | 7.96 | 381.60 | 389.56 |
| 0-71 .. | 7.35 | 358.70 | 366.05 |
| otal .. | 223.34<br>(38) | 358.70<br>(62) | 582.04<br>(100) |



Commerce Research Bureau

organising paddy dehusking centres deserves careful consideration. The details of this programme should be worked out in consultation with the Food Corporation. The Commission should take the responsibility for organising these centres under its aegis, while the Corporation would be responsible for supplying paddy and lifting the dehusked rice produced at these centres. This would relieve the Commission of the problems of marketing and also help in ensuring regular employment through continuous supply of the required amount of raw material to the centres.

Co-operative enterprises for processing of cereals and pulses have been successfully organised in certain parts, particularly in Tamil Nadu, Mysore, Kerala and Andhra Pradesh. A careful study of the factors contributing to the success of these co-operatives should be made and thereafter steps should be taken to multiply these co-operative societies in all parts of the country.

A Gujarati woman working on improved pestle and mortar

Stricter enforcement of the rules framed under the Rice Milling Industry Regulation Act will create favourable climate for organising agricultural labour into processing co-operatives. For this, State Governments should post staff with the necessary expertise at t district level. A co-ordinated distr programme for procurement of pac and its processing should be worked o and implemented through mills a handpounding centres in consultat with the representatives of the F Corporation of India, Khadi and Vill Industries Commission and the mille Certain price preference for the outp marketing assistance and managem grants may be given in the initial per in order to strengthen their economy a organisation of these decentralised p cessing centres.

**Table 5 : Production, sales and employment** (*a*)

(Qty. : Lakh quintals. Value : Rs lakhs)

| Year | Production (*b*) | | Sales (*c*) | | Employment ('000) | |
|---|---|---|---|---|---|---|
| | Qty | Value | Qty | Value | Full time | Part time |
| 1953-54 .. .. .. | N.A. | 53.60 | N.A. | 58.79 | N.A. | N.A. |
| 1954-55 .. .. .. | N.A. | 59.60 | N.A. | 65.54 | 4.0 | .. |
| 1955-56 .. .. .. | 1.91 | 76.40 | N.A. | 83.82 | 5.1 | 1.5 |
| 1956-57 .. .. .. | 4.80 | 192.00 | N.A. | 211.20 | 27.9 | 188.6 |
| 1957-58 .. .. .. | 4.38 | 175.20 | N.A. | 192.72 | 23.7 | 193.1 |
| 1958-59 .. .. .. | 4.17 | 168.20 | N.A. | 183.48 | 6.5 | 7.4 |
| 1959-60 .. .. .. | 5.20 | 208.00 | 2.65 | 146.32 | 9.9 | 12.0 |
| 1960-61 .. .. .. | 8.49 | 356.50 | 4.11 | 241.72 | 17.7 | 28.6 |
| 1961-62 .. .. .. | 9.83 | 442.35 | 5.00 | 272.59 | 28.0 | 29.3 |
| 1962-63 .. .. .. | 10.22 | 411.68 | 5.05 | 318.35 | 16.3 | 41.3 |
| 1963-64 .. .. .. | 7.02 | 308.02 | 3.31 | 215.43 | 11.0 | 42.6 |
| 1964-65 .. .. .. | 6.18 | 366.75 | 2.60 | 188.49 | 7.7 | 39.1 |
| 1965-66 .. .. .. | 6.19 | 420.44 | 3.30 | 247.10 | 10.2 | 45.9 |
| 1966-67 .. .. .. | 6.21 | 683.22 | 2.53 | 231.80 | 5.5 | 44.5 |
| 1967-68 .. .. .. | 7.29 | 1437.17 | 3.33 | 244.64 | 9.3 | 34.1 |
| 1968-69 .. .. .. | 11.79 | 1572.65 | 4.08 | 383.43 | 10.2 | 48.0 |
| 1969-70 .. .. .. | 10.41 | 1510.87 | 3.74 | 327.99 | 8.0 | 33.5 |
| 1970-71 .. .. .. | 9.90 | 1615.63 | 4.90 | 443.12 | 10.3 | 19.6 |
| Compound Average rate of growth between 1955-56 and 1970-71 .. .. .. | 11.6 | 22.6 | 5.3 | 11.9 | 4.8 | 10.6 |

N.A.=Not available.

(*a*) These data relate to the programme of Khadi and Village Industries Commission only.

(*b*) These data include production for self-consumption.

(*c*) These exclude production for self-consumption.

Institutional financing has not ma any big headway in the decentrali processing field. For this, the Comm sion should initiate a pilot scheme collaboration with the nationali banks and State Bank of India in a f selected centres, for which the need technical assistance and expertise wo be given by the Commission. The ganisations under the Commission act as developmental agencies throu which the banks can operate. Si these industries are covered under Credit Guarantee Scheme of Gove ment of India, there should not be a insuperable difficulties in making av able to them concessional finance.